

**ANTENATAL AND DELIVERY CARE AT**  
**THE METHODIST RURAL HEALTH CARE CENTRE**  
**IN MURSAN, INDIA**

A combined observational study of antenatal and delivery care, and a retrospective investigation of birth complications in 2007



**A student thesis by Marthe Kopland and Helle Lee Elena Beck Figenschow**

**Supervisor: Professor dr. med. Babill Stray-Pedersen**

**Faculty of Medicine**  
**University of Oslo, Norway**  
**November 2008**

## **ABSTRACT**

This thesis is a combined observational study of antenatal and delivery care provided by the Methodist Rural Public Health Program (MRPHP), and a retrospective study of delivery complications that occurred during the year of 2007 at MRPHP's clinic in Mursan. The clinic is located in a rural area in the state of Uttar Pradesh in northern India.

In addition to a five weeks field work at the MRPHP-clinic in Mursan in the summer of 2008, we have examined the clinic's birth statistics and recording system in order to find the frequency and nature of delivery complications seen at the clinic in 2007.

We have compared the antenatal care and the management of the complications with the guidelines given by the WHO and existing literature. We found that the guidelines are followed to a great extend. Some guidelines are not yet implemented, mostly due to the lack of anaesthesiological facilities and facilities for blood transfusion and hysterectomy.

The main causes of maternal death worldwide are severe bleeding, infections, unsafe abortion, hypertensive disorders and obstructed labour. All of these conditions are observed in Mursan – some of them as acute conditions occurring during delivery at the clinic, and some of them at deliveries or abortions at home. Some of the conditions might have led to severe morbidity or even death had they not been managed by skilled birth attendants at a well organized health institution.

## **TABLE OF CONTENTS:**

1. Introduction
2. Method and material
  - 2.1 Delivery reports
  - 2.2 Patient-cardex
  - 2.3 Observation of deliveries and checkups
  - 2.4 Interviews with the midwives and the doctors
  - 2.5 Interviews with the director
  - 2.6 Literature
3. The health system in India
  - 3.1 Health care in general
  - 3.2 Medical health and family welfare in the state of Uttar Pradesh
  - 3.3 Governmental and private health institutions
4. Methodist Rural Public Health Program (MRPHP)
5. Maternal mortality
  - 5.1 Maternal mortality in numbers
  - 5.2 Why do mothers die?
  - 5.3 The Millennium Development Goals
  - 5.4 What could be done to improve maternal health?
6. Antenatal care
  - 6.1 The WHO model for antenatal care
  - 6.2 Does ANC have any effect on reducing maternal mortality?
  - 6.3 Antenatal care at the Mursan clinic
  - 6.4 Mursan's antenatal care in numbers
  - 6.5 Antenatal care and deliveries at the Mursan clinic during 2007
7. Complications reported at the Mursan clinic during 2007
  - 7.1 Complications in numbers
  - 7.2 Complications after home deliveries
    - 7.2.1 Home deliveries in India
    - 7.2.2 Traditional birth attendant training
    - 7.2.3 Complications after home deliveries at the Mursan clinic
    - 7.2.4 How to raise the number of institutional deliveries in India
  - 7.3 Hypertension in pregnancy
    - 7.3.1 Diagnosis of hypertensive disorders
    - 7.3.2 Management
    - 7.3.3 Hypertension at the Mursan clinic
  - 7.4 Malpresentations
    - 7.4.1 Breech presentation
    - 7.4.2 Face presentation
    - 7.4.3 Multiple gestations
    - 7.4.4 Malpresentations and multiple gestations at the Mursan clinic

- 7.5 Poor progress in labour
  - 7.5.1 False labour
  - 7.5.2 Prolonged latent phase
  - 7.5.3 Prolonged active phase
  - 7.5.4 Cephalo-pelvic disproportion
  - 7.5.5 Obstruction
  - 7.5.6 Inadequate uterine activity
  - 7.5.7 Prolonged expulsive phase
  - 7.5.8 Prolonged labour at the Mursan clinic
- 7.6 Asphyxic baby
  - 7.6.1 Definition and diagnosis
  - 7.6.2 The Apgar score
  - 7.6.3 Management of the newborn baby
  - 7.6.4 Management of the newborn baby at the Mursan clinic
- 7.7 Instrumental vaginal delivery
  - 7.7.1 Ventouse delivery
  - 7.7.2 Forceps delivery
  - 7.7.3 Caesarean section
- 7.8 Injuries to the birth canal
  - 7.8.1 Perineal injuries
  - 7.8.2 Management of perineal injuries
  - 7.8.3 Perineal injuries at the Mursan clinic
  - 7.8.4 Vaginal injuries
  - 7.8.5 Vaginal tears and lacerations at the Mursan clinic
  - 7.8.6 Cervical injuries
  - 7.8.7 Cervical injuries at the Mursan clinic
  - 7.8.8 Visceral injuries
- 7.9 Episiotomy
  - 7.9.1 Definition
  - 7.9.2 Performing the episiotomy
  - 7.9.3 Episiotomy at the Mursan clinic
- 7.10 Postpartum haemorrhage
  - 7.10.1 Definition
  - 7.10.2 Management of third stage bleeding
  - 7.10.3 Management of true PPH
  - 7.10.4 Management of traumatic PPH
  - 7.10.5 Secondary PPH
  - 7.10.6 Postpartum haemorrhage at the Mursan clinic
- 7.11 Retained placenta
  - 7.11.1 Definition
  - 7.11.2 Management
  - 7.11.3 Retained placenta at the Mursan clinic
- 7.12 Macerated foetus

## 8. Discussion and conclusion

## 9. Sources

## **1. INTRODUCTION:**

This thesis is a combined observational study and a retrospective investigation of birth complications that occurred during the year of 2007 at the Methodist Rural Public Health Care Centre in Uttar Pradesh in India.

During august and september 2008, we spent five weeks at the MRPHC-clinic in Mursan, where we participated in the daily routines – with special focus on maternal health, e.g antenatal care, delivery care and immediate postpartum care. Furthermore we examined the clinic's delivery statistics and record system to study the frequency and nature of birth complications seen in the clinic in 2007. We have compared the antenatal care and the management of the delivery-complications at the clinic with the guidelines given by the WHO and with available literature.

Our aim is to put focus on maternal health in general as there is still a long way to go to be able to grant the world's women safe pregnancy and delivery. We present the WHO reports on maternal health with focus the possibilities of preventing maternal morbidity and mortality.

The total annual number of maternal deaths now stands at 536 000 *“often sudden, unpredicted deaths which occur during pregnancy itself (some 68 000 as a consequence of unsafe abortion), during childbirth, or after the baby has been born – leaving behind devastated families, often pushed into poverty because of the cost of health care that come too late or was ineffective”* (1).

The WHO department of Making Pregnancy Safer has defined three pillars of importance to prevent maternal mortality and morbidity:

- Family planning.
- Skilled care during pregnancy and delivery.
- Emergency obstetric care to deal with complications (2).

The Methodist Rural Public Health Care Centre provides services along all three of these main pillars in addition to general health care for the local population in Mursan. The centre has special focus on maternal health and on detection and treatment of HIV/AIDS and tuberculosis. The maternal health work includes training of traditional birth attendants in addition to the direct care given at the clinic.

In a society where most deliveries still take place at home, and the lifetime risk for a woman to die in relation to childbirth is 1 in 70, this work is of great importance.

## **2. METHOD AND MATERIAL**

During our 5 weeks stay at the Methodist Public Health Centre, MPCH, we focused upon the different complications occurring in the delivery room. We wanted to get an impression of the different types of complications and to learn more about their management. We also wanted to see if there were any association between antenatal care given, and the outcome at delivery. In the following we will present our sources of information.

### **2.1. Birth reports:**

Information about every delivery in the MCHC is noted in a delivery-registerbook, kept in the delivery-room. The following information on every delivery is registered:

- Patients and husband name
- Village and district
- Age
- Number of children, number of pregnancies
- Date, time
- Nature of delivery
- Duration of first and second stage
- Length and weight for the baby
- The person who conducted the delivery

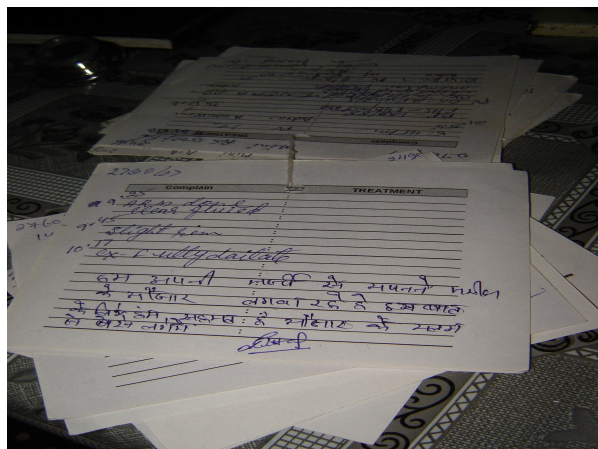
We went through this information for at all the deliveries in 2007. We specifically looked into «nature of delivery», where a normal delivery is coded ND. Complications are listed, as well as assisted deliveries and nature of assistance.

### **2.2. Patient cardex:**

To see if there is any association between antenatal care given and the outcome of the delivery, we compared the birth-register with each patient's card.

The journal system in the MPHC is quite old-fashioned. The first time a patient visits the clinic, he or she gets a little card with a number, which must be brought every time the patient visits the clinic. This number is used to find the patients cardex in the archives of the clinic.

The cardex includes a front card, with the patients name, age, caste, village and the patient's fathers name. All the information about the patient is written on several cards, kept together on a string. The patient's complaints, the staffs conclusion and treatment given are noted. The text is partly English and partly Hindi, depending on who has written the note.



*Picture 1: An example of a patient cardex*

Obviously, this system provides a lot of problems; cards are missing, patients forget their card number, cards are misplaced within the system, and so on. During our fieldwork, we looked into all the deliveries during the year 2007. 261 deliveries were recorded at the clinic during this year, and we managed to collect information about 244 of them. 17 cards were impossible to find, and for some women we only found parts of their cardex.

The following information was collected from the cards:

- Whether the patient has received any antenatal care, and if so, how many visits?
- What kind of tests are performed during these antenatal checkups?
- Details about the delivery and the complications, if any.

### **2.3. Observations of deliveries and checkups:**

During our stay we observed 30 deliveries, with one of us assisting, if possible.

During the first and second stage of delivery, we performed vaginal examinations to monitor the progress. We were instructed in delivery-techniques during labour, stitching-procedures and management of third stage, including manual removal of the placenta.

We observed the midwives, the doctors and the nurses, to see how the different tasks during a delivery were performed. We also observed a number of antenatal checkups, and were allowed to participate in the examinations.

### **2.4. Interviews with the midwives and the doctors:**

We spent most of our time at the Mursan clinic observing the doctors and midwives doing their work, and had the opportunity to discuss the different cases with them. We went with a team including one midwife, the female doctor and two four-months students, to the Beswan clinic, and observed the antenatal care and the vaccinations performed there. The many hours spent in the delivery room waiting for a woman to reach the second stage, was used to discuss different issues with both the doctors and the midwives. The four-months students, whose functions were like nurses', taught us instant care for the neonate.

### **2.5. Interviews with the director:**

We interviewed the director, Reidun Refsdal, who also provided us with statistics from deliveries and antenatal care, for the period 2003-2007.

### **2.6. Literature:**

To gain more knowledge about obstetrics in general, standard procedures, and the different birth complications, we consulted several sources:

- Textbooks: We have consulted several textbooks in obstetrics. All of them are listed in the reference list. The only obstetric textbook available in Mursan was a 1992 edition of D. Duttas 'Textbook of Obstetrics'. The guidelines in this book are to some extent followed at the clinic today.
- Articles: We have performed unsystematic literature searches in NEL, MedLine and the Cochrane Library using each complication as search terms.
- Guidelines: We consulted WHO's and BMJ's guidelines for diagnoses and management of the different complications, and WHO's guidelines for antenatal care.
- Survey: We have used information from The National Family Health Survey (2005-2006), which is providing information on population, health and nutrition in India.
- General information was collected from different organizations' official websites. The following organizations were: WHO, UN, MPHC, National Institute of Health and Family Welfare (India), Ministry of Health and Family Welfare, Government of India, Department of Medical, Health and Family Welfare, Government of Uttar Pradesh,

### **3. THE HEALTH SYSTEM IN INDIA:**

#### **3.1 Health care in general:**

With more than one billion people, India is the second most populous country in the world accounting for 17% of the world's population. Following independence, India has pursued a policy of planned economic development until the early 1990s, when it shifted to structural adjustment policies and liberalization. Subsequently, the Indian economy grew at a fast rate though concerns on poverty persist (3). The country has emerged as a global player in several areas, including information technology, telecommunications, and pharmaceuticals.

The subcontinent is characterized by large diversities in geographical regions, socio-cultural groups, and health needs. According to WHO-India, it faces three main groups of health challenges:

- Dealing effectively with unfinished agendas of communicable diseases, maternal and child health, and health systems strengthening;
- Dealing with new emerging challenges such as the premature burden of noncommunicable diseases (NCDs); and
- Dealing with globalization related issues while contributing to the management and shaping of the global policy environment.

**Table 1: WHO's general statistics on India (3):**

Total population (2005)	<b>1 103 371 000</b>
% under 15 (2005)	32
Population distribution % rural (2005)	71
Life expectancy at birth (2004)	62
Under-5 mortality rate per 1000 live births (2004)	85
Maternal mortality ratio per 100 000 live births (2001-2003)	301
General government expenditure on health as % of general government expenditure (2004)\$	3,6
Human Development Index Rank, out of 177 countries (2003)	127
Gross National Income (GNI) per capita US\$ (2005)	720
Population living below national poverty line % (1999-2000)	26,1
Adult (15+) literacy rate % (2000-2004)	61,0
Adult male (15+) literacy rate % (2000- 2004)	73,4
Adult female (15+) literacy rate % (2000- 2004)	47,8
% population with access to improved drinking water source (2002)	86
% population with sustainable access to improved sanitation (2002)	30



**India's health sector** is diverse and includes the modern system of medicine as well as multiple traditional systems. Health care is largely the responsibility of the states. The rural health services infrastructure is widespread, starting with community workers, sub-centers, primary health centers, community health centers, secondary level district hospitals, up to medical colleges and their tertiary facilities. The private sector is large and unregulated (3).

**Numerous international partners are active in the health sector in India**, including UN agencies, international NGOs, multilateral organizations and bilaterals. During the mid 1990s, the World Bank Group has emerged as the major external funding agency (3).

Development assistance, including loans and grants, has ranged between 1-2% of the total public health expenditure. Although external funding is relatively small, its value added and benefits are high as recognized by the government, mainly in sharing expertise, knowledge, international lessons, policy options, normative functions, standards, operational guidelines, and technical support (3).

Recent years have also witnessed the emergence of global bodies such as the Global Alliance for Vaccine Initiative, the Global Fund for AIDS, TB and Malaria, the Clinton Foundation's HIV/AIDS Initiative, and the Bill and Melinda Gates Foundation. Recently, Norway has committed NOK 500 million under the Norway-India Partnership to catalyze national efforts towards achieving MDG-4 for reducing child mortality.

**WHO** aligns its country cooperation strategy (CCS) with the priorities and evolving needs of the country. While WHO in India will maintain its technical collaboration in various areas of work in the health sector, it intends to scale up its efforts aiming at four strategic objectives, major components of which are central to the pursuit of the Millennium Development Goals.

1. **Reduce the burden of communicable and emerging diseases by enhancing surveillance and response capacities.** Communicable diseases account for about 38% of the disease burden with large variations across states. New or re-emerging diseases have highlighted the importance of strengthening public health systems, rapid response capacity, infection control, and timely health information (3).
2. **Promote maternal and child health, notably by improving the continuum of care and strengthening immunizations.** Maternal and child health issues are significant, including high rates of malnutrition. There are major differences among the states concerning reproductive, maternal, newborn and child health. Adolescents constitute 22 percent of the total population, and about 70% of adolescent girls are anemic (3).
3. **Scale up prevention and control of noncommunicable diseases through support for development of new policies and programmes.** NCDs have evolved as major public health problems and accounted for 53 percent of all deaths in the age group 30-59 years in 2005 (3). Tobacco is widely consumed and remains as the single most important preventable risk factor. Road traffic injuries result in the death of more than 100 000 people every year (3). Effective multisectoral policies and behavioral interventions would enhance the prevention of NCDs.
4. **Develop and strengthen health systems within the national and global environment.**

### **3.2. Medical health and family welfare in the state of Uttar Pradesh:**

As mentioned health care is largely the responsibility of the states. Each state has a department of health and family welfare, responsible for the services provided.

#### **Department of Medical, Health and Family Welfare, Government of Uttar Pradesh**

is responsible for providing Medical, Health and Family welfare related services to the densely populated state of Uttar Pradesh (166.052.859) spread over a vast area of 240.982 sq km (4). The department presents its agenda as follows:

*“Department of medical health and family welfare is committed to provide high quality , affordable and accessible, preventive, curative, promotive and comprehensive health care services to the people of Uttar Pradesh with special focus to the disadvantaged population”*  
(4).

The health care services are defined into three levels:

#### **Level 1:**

First level health services are provided in urban areas through District Male and Female or Combined Hospitals and are at district level. These hospitals are generally 100-500 bedded hospitals, where various medical facilities are provided. At present there are 80 district hospitals, 6 combined hospitals and 63 female hospitals available in the state of Uttar Pradesh (4).

#### **Level 2:**

At this level health services are provided through Community Health Centers established at the tehsil and block level. Presently the standard for setting up the CHC is population. For each one Lakh population (100.000) in rural areas one CHC is set up. Each CHC is set up with the objective of providing standard Health services to the public in the rural areas. Each CHC has 30 beds. At present in the state there are 308 CHCs operational. At present following specialties are required at CHC: Physician, Surgery, Gynecologist and Radiologist. (4).

#### **Level 3:**

At the third level health services are provided in remote rural areas through the Primary Health Centres, Additional Primary Health Centers and Sub Centers. PHCs/ Additional PHCs are established at the village level, having 4 beds each. There are presently 18 565 sub-centers, 810 block level PHCs and 2830 additional PHCs operational. Basically mainly Mother and Child care programs are implemented using Sub Centre. Apart from these there are few rural women hospitals where safe delivery facility is provided (4).

#### **Free Health Facilities provided in UP are:**

- Immunization of pregnant women and distribution of iron and folic acid tablets.
- Safe delivery.
- Post delivery care of mother and child.
- Immunization of children.
- Acute Respiratory Infection (ARI) and diarrhea in children.
- Distribution of contraceptives.
- Intra ocular lens implant and cataract operation.
- Family planning information dissemination
- AIDS awareness
- Tuberculosis treatment
- Leprosy treatment.

### **3.3. Governmental and private health institutions:**

During our stay in Uttar Pradesh, we visited a few other health institutions in addition to the Methodist Public Health Center in Mursan, some of them governmental and some of them private. Among the institutions we visited were the local Primary Health Centre in Mursan, the District Hospital in Hathras and a private Paediatric Ward.

The governmental PHC in Mursan is supposed to provide the free health facilities granted by the state government. The centre was in a horrible condition when it comes to facilities, hygiene and staff. There was no available doctor at the centre, even as there was one employed. The delivery-room was dirty, with no heat and there was no possibility to sterilize tools or gloves. The care given at the centre is indeed free, but we found ourselves questioning whether the risk of complications, especially infections, after a delivery at the PHC is even higher than after a home delivery.



*Picture 2: The delivery room at the local governmental Primary Health Centre in Mursan.*

Seen in this context, the Methodist Public Health Centre is still a sorely needed resource in Mursan, as the staff is highly competent, experienced and available 24 hours a day, the hygiene standard is high (in Indian standards) and the centre is relatively well equipped.



*Picture 3: The HIV-delivery room at MPHC in Mursan.*

The District Hospital in Hathras is a well equipped hospital with qualified staff ready to provide the care and treatment that is necessary for (most of) their patients. We came across only one major problem concerning the hospital. Being the District Hospital it is responsible for performing Caesarean Sections. The Methodist Clinic in Mursan does not have the facilities to carry out Caesarean Sections, and women who need a section are sent to the Hathras hospital (sometimes the section is performed at this hospital, and sometimes the woman is sent to a private hospital). As for HIV-positive women, the hospital is not ready to perform a Caesarean Section. The doctor responsible for HIV-positive patients at the Hathras Hospital has expressed explicit that she will not perform any surgery on these patients. This leaves the Methodist Public Health Center in Mursan without a hospital which HIV-positive women in need for a section can be transferred to. This has been a major concern for a long time. Fortunately, in august 2008, the Jawaharlal Nehru Medical College and Hospital in Aligarh which is supported by the Government and run by the muslim community, agreed to receive those patients from the Methodist Clinic in Mursan.

The private Pediatric Ward that we visited during our stay is situated in Hathras and provides care for neonates with special needs. Asphyxic babies and babies with congenital abnormalities are transferred from the Methodist Clinic in Mursan when necessary. The ward has the staff and facilities that is needed, but the hygiene was of a terribly low standard when we visited.

#### **4. METHODIST RURAL PUBLIC HEALTH PROGRAM (MRPHP):**

The Methodist Public Health Center (MPHC) with clinic was opened in 1962 and was the first Health Care Center in Mursan. Before this a medical team from CFC Hospital Vrindaban came weekly to Mursan, but this did not cover the needs of the population. Over the years the MPHC have grown and the work has expanded from a small clinic to a multi project. Looking at the services provided, the clinic is equivalent to a PHC (primary health center) although it is definitely not run by the government.

The MPHC-clinic in Mursan is situated in Hathras District in the state of Uttar Pradesh. The town of Mursan has a population of about 10-15.000 people. The Center has 2 doctors appointed, Dr. Mamta Kaushal and Dr. Vishal Michael.



*Picture 4: The staff at the Mursan clinic.*

The clinic provides antenatal care-services twice a week, vaccination for children once a week, charity-day once a week (free medical services for poor people), and general medical services twice a week. The clinic is open 24 hours for emergencies and deliveries (5).

In addition to the daily activities at the clinic in Mursan, MRPHP runs a number of health-related projects. One of the latest projects started – in October 2005 – is the diagnosis and treatment project (DOT and Microscopy) for tuberculosis patients. This project is fully supported by the Government, and includes diagnosis and treatment of tuberculosis patients, training of staff and DOT (direct observed treatment, e.g the patients receive their medication 3 times per week overlooked by the staff) (5).

Since 2003 MRPHP have been focusing on HIV/AIDS. The TBA's Project, on which 10226 traditional birth attendants was trained, was converted into a HIV/AIDS Project in 2004. This work is supported both by the Government in UP and by NORAD. Awareness Camps are held regularly in 10 blocks of Hathras and Aligarh Districts. In the clinic in Mursan there is a possibility for HIV positive women to deliver safely, safe both for the patient and the staff conducting the deliveries. The program is also running a Dhaba Project on the Highway between Delhi and Agra (5).

The clinic in Mursan has 4-8 sterilization camps during a year. This is in collaboration with the Local Government in Hathras and Mursan. On these camps sometimes more than 100 women are operated in one day. During 2007, close to 500 women were operated (5).

**Overview of MRPHP's activities as presented at the centers web-site (5):**

**01. Methodist Public Health Center & activities in Mursan**

- A. [The Mursan Clinic : Ante Natal Care, Vaccination for children, Poor People Clinic](#)
- B. [DOT Programme, Testing, Diagnose and Treatment for Tuberculosis](#)
- C. [Day Care Center](#)
- D. [Nurse Aid & Child Health Training Course \(4 Months\)](#)
- E. [Training place for Nursing Students](#)
- F. [Training for Medical Students from Norway and Canada](#)
- G. [Scholarship Program](#)

**02. Beswan Clinic / Center**

**03. Karhari Clinic / Center**

**04. HIV / AIDS Projects:**

- A. [Awareness and Testing Camps in 10 Blocks in Aligarh and Hathras Districts](#)
- B. [Dhaba Project](#)
- C. [Temple Camps, Awareness and Testing Camps on temples.](#)
- D. [Widows Ashrams, Health camps](#)
- E. [HIV/AIDS Ward on NIRPHAD Center](#)
- F. [Counseling Room in SJSH Hospital, OIL Refinery Mathura](#)
- G. [Support Group Meetings, first Friday every month](#)
- H. [ASHA HIV Building in Mursan.](#)

**05. CSSM Programmes / activities**

- A. [Re-Training for TBA's](#)
- B. [Baby Show](#)
- C. [Handicap Meetings](#)
- D. [Youth Club / Womens Club](#)

**06. Cooperation with the Local Government**

- A. [Sterilization Camps, women and Sterilization Camps, men](#)
- B. [Eye Camps, check up and operations](#)
- C. [Health Camps](#)

## **5. MATERNAL MORTALITY:**

### **5.1. Maternal Mortality in numbers:**

Everyday, 1500 women die due to pregnancy or childbirth-related complications. In 2005, the estimated number of these deaths were 536 000 worldwide. Most of these occurred in developing countries (6). The ICD-10 definition of maternal death is: «the death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.»

**Maternal Mortality Ratio**, MMR, is defined as the number of deaths during a given time period per 100 000 live births in the same period. **Maternal Mortality Rate**, **MMRate** is the number of deaths in a given time period per 100 000 women of reproductive age in the same period. **Lifetime Risk** of maternal death is the probability of maternal death during a woman's reproductive life, usually expressed in terms of odds (7).

The incidence of maternal mortality is reflecting the gap between rich and poor. Out of the estimated number of 536 000 maternal deaths worldwide in 2005, 99 % occur in developing countries. More than 50 % occur in Sub-Saharan Africa, and one third in South Asia. In the developing regions the MMR is 450 maternal deaths per 100 000 live births, compared to 9 in developed areas (6). When it comes to lifetime risk of maternal death, the world as a total has a lifetime risk of one in 92. If we look to the developing world, the mean lifetime risk of dying due to pregnancy related causes is 1 in 75. The country with the worst statistics is Niger, with the depressing number of 1 in 7. This is in stark contrast to the developed countries, with the mean lifetime risk of 1 in 7300, and with Ireland on top, which had a lifetime risk of 1 in 48 000 (7).

As we can see, there are big differences between continents, but the numbers change from region to region within the continents too. Asia has a mean lifetime risk of maternal death at one in 120. Eastern Asia is the best region with 1 in 1200, western Asia is second best with a lifetime risk 1 in 170, before South-east Asia (1 in 130). On the bottom of the statistics is South Asia with a lifetime risk of 1 in 61 women (7). India is a part of this last group, and is also the country with the largest number of maternal deaths, reported to be 117 000 in the 2005 statistics. Even if we consider that this is a big country, with a total population of more than 1,1 billion people, the number is still high. The MMR estimated for 2005 was 450 maternal deaths per 100 000 live births, and the lifetime risk for an reproductive Indian woman is 1 in 70. As we can see, India is high above the Asian mean lifetime risk (1 in 120), and the mean Asian MMR, which is 330 (8). According to the 2005 statistics from the NFHS-3, 47 % of the live births were attended by a skilled birth attendant. This number has been raising the last ten years, from 34 % in 1992-1993 (9).

To measure the levels of maternal mortality in a population is complicated. It is often difficult to identify a death as of a maternal kind, and the death of a woman might not be recorded at all. If recorded, the pregnancy status may not be known. In many developing countries, routine registration of deaths do not exist, and these countries are often the ones with the highest maternal mortality. In the absence of complete and accurate civil registration systems, UN base their MMR estimates upon a variety of methods, including household surveys, sisterhood methods and more.



## 5.2. Why do the mothers die?

Most of maternal deaths occur between the 3rd trimester and the first week after delivery, with a peak on the 1st and 2nd day after birth (6). The five main causes of maternal mortality cause more than 70 % of maternal deaths worldwide (10): severe bleeding, infections/sepsis, unsafe abortion, hypertensive disorders (pre-eclampsia and eclampsia) and obstructed labour. The causes of maternal mortality can be divided into direct- and indirect causes. Direct causes are direct consequences of pregnancy and childbirth, while indirect causes are maternal deaths from diseases that are not unique to pregnancy, but which strongly affects the pregnant woman. Globally, 80 % of the maternal deaths are due to direct causes (6).

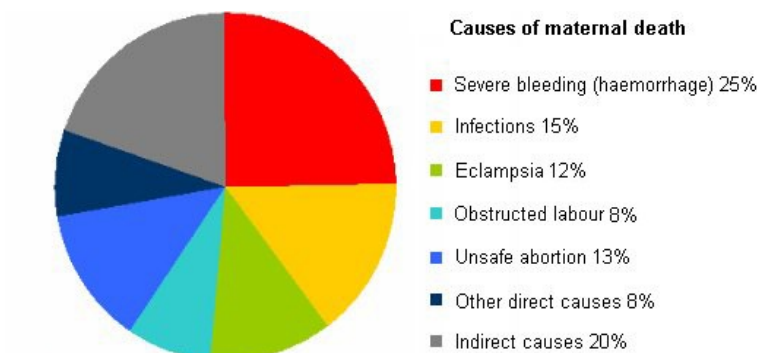
Direct causes:

- Severe bleeding, mostly PPH (25 %)
- Hypertensive diseases, usually eclampsia (12%)
- Infections, mostly sepsis (15 %)
- Obstructed labour (8 %)
- Complications after unsafe abortion (13%)
- Others (8 %)

Indirect causes:

- HIV
- Anaemia
- Malaria/hepatitis/tuberculosis/diarrhoea/tetanus
- Cardiovascular disease
- Murder/violence/suicide

**Figure 1: Causes of maternal death.**



Source: The World Health Report 2005. Make every mother and child count.  
Geneva, World Health Organization, 2005.

Most of these deaths could have been avoided. Skilled care at delivery makes the greatest difference. The largest killer of them all, the postpartum bleeding, can kill even a healthy woman if unattended, within two hours (11). An injection of oxytocin immediately after birth reduces the risk of bleeding effectively. Sepsis can be widely reduced if aseptic techniques are used. Hypertensive disorders in pregnancy can be monitored and treated, and administration of drugs during labour can lower the risk of eclampsia. Obstructed labour can be predicted and managed by a skilled birth attendant.

The indirect causes are harder to avoid, as they more than the direct causes, are part of a bigger picture. Diseases like HIV, malaria, hepatitis and tuberculosis are frequent in the countries with the highest levels of maternal mortality, and development of a more efficient health care system is needed to prevent these problems. According to ICD-10, incidental or accidental causes are not included in the definition, and a lot of maternal deaths are probably not detected because of this definition. In India, deaths due to domestic violence were the largest cause of death during pregnancy (12).

In most countries over half of the maternal deaths occur in hospitals. There are three main scenarios leading to these deaths (14):

- \*Women who arrive at a moribund state too late to benefit from emergency care.
- \*Women who arrive with complications and who could have been saved if they had received effective interventions earlier
- \*Women admitted for normal deliveries who subsequently develop serious complications, either naturally or iatrogenic.

Problems of physical, cultural or financial character delay the women in developed countries on their way to a safe delivery. **The first delay** is the recognition by the women and their families for the need of care. **The second delay** includes all the barriers in the specific community of accessing care. **The third delay** concerns the possibility of receiving effective care at the health care institution, depending on both the staff and the facilities (14).

The NFHS-3 from 2005-2006 is the third survey produced, that provides information on health in India in general and in the different states of the country separately. The survey reports that two out of five births in India take place at health facility, and this number has grown since the first survey in 1992-1993 (15). Home deliveries are more common among women receiving no ANC, older women, uneducated women, women in the lowest wealth quintile and women with more than three previous births. The most common reason for giving birth at home was that the women actually didn't feel the need for a health institution, but one in four reported that delivery in a health facility was too expensive for them (15). 49 percent of the home deliveries were assisted by a professional, and more than one third were delivered by a TBA. The remaining births were assisted by a relative or another untrained person (15).

In Uttar Pradesh specifically, 22 % of the deliveries happened in an institution, but with great differences between urban areas (40 %) and rural areas (18 %). Almost 30 % of the total number of births in the district was attended by some kind of health personnel. In urban areas the percentage was close to 50, in rural areas 23,8 percent. At a total, 14,2 % received postnatal care within 2 days, also this considerably more in the urban areas. As we can see, the urban areas in Uttar Pradesh show numbers close to the national standard, while the rural areas are far below (15).

### **5.3. The Millennium Development Goals (MDG)**

The Millennium Development Goals (16), were stated in September 2000, and the eight goals include reducing poverty and hunger, achieving primary education for all, empowering women, reducing child and maternal mortality, fighting HIV, malaria and tuberculosis, ensuring environmental sustainability and developing a global partnership for development.

The period of time described in the goals spans from 1990 to 2015, and the goals are meant to be achieved during the next seven years.

MDG 5 concerns maternal health, and is divided in two parts:

- Target 5.A: "reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio" Target 5.B: "Achieve, by 2015, universal access to reproductive health"

The indicators monitoring the first part of the goal are maternal mortality ratio, MMR, and the proportion of births attended by skilled health personnel. The indicators monitoring the second part are many: contraceptive prevalence rate, adolescent birth rate, antenatal care coverage and the unmet need for family planning (17).



MDG number five targets a 75 % reduction in the maternal mortality in 25 years, but the statistics do not show any uplifting developments. In 1990 the world total MMR was 430 deaths per 100 000 live births, falling to 400 in 2005. This is an annual change of -0,4 %, but to reach the MDG, an annual decline of 5,5 % is needed globally (17). Indicator 5.2, proportion of births attended by skilled health personnel, has on a world basis gone from 49 % in 1990 to 62 % in 2006. In the developing regions the number is 47 % to 61 %. The antenatal coverage, which includes at least one visit, has in total changed from 55 % in 1990 to 75 % of the women in 2005 (18). Looking at India specifically, the proportion of births attended by skilled health personnel has changed from 34,2 % in 1993 to 46,6 % in 2006. The antenatal care coverage were reported to be 49,1 % in 1993, raising up to 74, 2 % in 2006 (18).

#### **5.4. What can be done to improve maternal health?**

Globally, maternal mortality has decreased by less than 1 percent per year between 1990 and 2005. Some areas have managed to reduce their MMR by one third, such as Northern Africa, South-East Asia and Latin America. Sadly, the region with the highest level of maternal mortality, Sub-Saharan Africa, shows almost no change in their MMR

The Millennium Development Goals Report of 2008 shows a clear correlation between countries with high maternal mortality, and countries with a low percentage of deliveries helped by skilled birth attendants. Based on this information, the report concludes that **the most important factor for reducing maternal mortality is a skilled health worker**, meaning a doctor, nurse or a midwife. (18) This makes sense if we go back and look at the different reasons for maternal death. Direct causes, which account for 80 %, mostly occur during or right after the delivery. With professional health workers in charge of the delivery, and proper equipment available, a great deal of these complications could be avoided.

**The access to hospital care** must be improved, to make it possible for all women to receive the needed care. The care received in hospitals, must be of a **high standard**. The service should be **free**, or cost no more than what is reasonable for the woman and her family. **Training of midwives** is important to raise the percentage of attended births (18).

Information during pregnancy, and making a plan for the delivery improves the chance that the woman will deliver at the facility. **Antenatal checkups** improve maternal health during pregnancy, and this in itself improves the outcome. By using time during the visits to make a plan for the delivery, antenatal care can raise the number of births in a health facility.

Very early motherhood increases the risk of dying in childbirth, and child born by an adolescent mother is at a greater risk of dying in infancy. The young mothers miss out on education and have less opportunities than older mothers. By increasing the **availability of family planning**, the incidents of young mothers decrease. This also prevents close spacing of births, which raises the risk for both mother and child. (18)

Unplanned pregnancies have a higher mortality risk, both because of the socio-economic state of the mother, but also because of the high number of abortions performed without skilled personnel and the right equipment (10). By meeting the women's need for contraception, and by **liberation of the abortion laws**, the number of deaths caused by abortion will decline.

Improving the health-condition and nutrition of a population as a whole, and improving the **control of infectious diseases**, will indirectly improve the maternal outcome. All these interventions have different effects on the timing and causes of maternal deaths, and different strategies are needed to change the situations in the different regions.

## **6. ANTENATAL CARE**

Most of the serious complications which threaten the maternal health happen during or after the delivery, and can not be prevented by antenatal care. Antenatal care was earlier one of the Department of Making Pregnancy Safer's four pillars of importance to prevent maternal mortality, but today these pillars have been modified, and antenatal care no longer has its own pillar of importance (2). But none the less, antenatal care is still of great importance regarding reproductive health. Correct antenatal care will improve the mother's health during the pregnancy, and detect pathology which can be treated. All this will optimize the outcome of the pregnancy, both for mother and child. Information and support given during the visits will make the woman more prepared for emergencies and for the delivery itself, and dangerous situations can be avoided.

### **6.1. The WHO-model for antenatal care:**

In 2001 the World Health Organization introduced a new model for antenatal care, based on only four visits (19). A systematic review compared this WHO-model with the old standard model including more visits (5-7), in means of different outcomes like low birth weight, preeclampsia and eclampsia, urinary-tract infections and severe anaemia after birth. The review found no significant differences between the two groups, and concluded that a model with fewer visits is just as good as the old standard when it comes to these outcomes (7).

The WHO antenatal care model is based on the following principles (19):

- A simple form should be used to identify woman with special needs of care.
- Health workers should make all pregnant women feel welcome at the ANC facilities, and keep the opening hours as convenient as possible. Woman who arrives without an appointment should not be turned away, even if there is no emergencies.
- During the visit there should be enough of time for questions and conversation
- Any required interventions and tests should be done at the woman's convenience, preferably during one day. Only the examinations and tests that serve an immediate purpose should be preformed. If possible, quick-tests should be used. When positive, treatment should be initiated the same day.

In short, the model wants to make it easy for all women to receive antenatal care, and to feel safe and welcome during the visit.

The new WHO model divides the pregnant women into two groups: those who can receive routine basic care, and the higher risk-pregnancies in need of special care. This last group will statistically represent 25 % of all the pregnant women initiating ANC. A classifying form including 18 checklist questions is used to put a woman in the right group (20). The basic component care should during four visits include a number of actions presented in a special form called the basic component checklist. This list should be used to record interventions preformed at each ANC visit and should be incorporated into the patient's medical record(21).

The first visit should ideally occur in the first trimester, preferably before week 12, but whenever the woman first comes to the clinic, this visit should cover the same routine. Sufficient time must be available during each visit for discussion of the pregnancy and related issues with the patient, including general information about pregnancy and delivery, and pregnancy-related emergencies. Written instructions should accompany all verbal advise, or when necessary, drawn material for illiterate women (21).

The checklist includes:

**First visit:**

- A classifying form which indicates eligibility for the model is filled out.
- Clinical examination.
- Hb testing.
- Obstetric examination: gestational age, uterine height.
- Gynaecological examination (can be postponed).
- Blood pressure.
- Maternal weight/height.
- Rapid syphilis test.
- Urine stix.
- Blood typing.
- First tetanus toxoid vaccine.
- Iron/folic acid supplementation given.
- Give information on what to do if any emergency occurs.
- Complete ANC card.

**Second (and subsequent visits):**

- Clinical examination for anaemia.
- Obstetric examination: gestational age, uterine height, fetal heart rate.
- Blood pressure.
- Maternal weight.
- Urine stix.
- Iron/folic acid supplement given.
- Recommendation for emergencies.
- Complete ANC card.

**Third visit:**

- Repeat second visit program.
- Hb test .
- Tetanus toxoid second dose.
- Instructions for delivery.
- Recommendations for lactation/contraception.

**Fourth visit:**

- Repeat second visit program.
- Detection of any malpresentation.
- Complete ANC card, recommend it to be brought to the hospital at the time of delivery.

**6.2. Does antenatal care have any effect on reducing maternal mortality?**

Indirect effects of antenatal care are difficult to assess, but important to consider. Routine antenatal care may raise awareness about the need for care at delivery or give women a familiarity with health facilities that enables them to seek help more efficiently. Since an estimated 90 % of maternal deaths can be prevented with timely medical intervention, ensuring quick access to proper care is one of the most important aspects of safe motherhood in developing countries.

Several socio-demographic factors influence the likelihood of using professional health care at birth. Distance to services, high parity and low socio-economical status all have known negative association with the use of professional care, while problems experienced during delivery, exposure to media and education have known positive associations. Since women in rural areas rarely make health-related decisions independently, the educational level of the household are a more important factor, than the level of the individual woman.

A 1999 study from Varanasi (22) showed that there were both great variation in the use of antenatal care, and in the actual antenatal care given. After controlling for all interfering factors, like the ones mentioned above, the study showed a strong, positive association between the level of care given and the likelihood of using a trained attendant at delivery. Woman with high level of ANC (at the 75th percentile), had an estimated odds of using health professionals at the time of delivery that was almost four times higher than women with low level of ANC. The results provide support for the argument that antenatal care should be an integrated part of maternal health care. The most important factor in the fight against maternal mortality is the use of a health professional at the time of delivery, and by working to achieve this, antenatal care is of great importance in the fight against maternal mortality.



*Picture 5: Mother and child at the Mursan clinic*

### **6.3. Antenatal care at the Mursan clinic (5)**

At the Mursan clinic, there are two ANC-days a week, Monday and Thursday. On these days, a large part of the antenatal check-up is free, compared to the other weekdays, where the patient has to pay for it all. Preferably, the midwives want the pregnant woman to seek the clinic from her 5th month of pregnancy, and after this at least once a month, and after the 36th week, she should come every week. If something is wrong or the woman is worried, she should of course come to the clinic whenever she feels it is right.

On the first antenatal visit, the woman's weight and blood pressure is noted by the nurses, and the woman is then examined by the doctor, who measures fundus-height, decides position, check fetal heart sound, and if necessary perform a PV. The indications for gynaecological examination are pain, leaking and discharge. The general examination is free, but gyn.ex cost 30 rp extra. After the clinical examination the lab tests are taken. Urinstix and Hb are free, but the other tests must be paid for. The advisable tests are VDRL (40 rp), HbsAg (125 rp) HCV (125 rp) HIV (150 rp) and blood grouping (30 rp). This is often a problem for the patient, as many patients do not have enough money for all the tests, but it is possible to spread out the expenses over several visits.

It is important that the VDRL test is taken as soon as possible, because syphilis could cause problems during pregnancy, in worst case, miscarriage or stillbirth. The father of the child should also take this test. At the first visit, ideally at the 5th month of pregnancy, the woman should be given the first vaccination with tetanus toxoid, and the second boost should be given during the 6th month. This is free of charge. The woman also receives iron/folic acid/calcium tablets for free during the pregnancy. Last, but not less important, is the 'moral support'-talk the midwives have with the pregnant woman. She is taught about nutrition, what she should eat during pregnancy, basic hygiene, and is told to rest in the middle of the day, avoid hard physical work etc.

On the following visits the woman is always weighed and the blood pressure is always measured. The doctor performs the same examination as described above, and any remaining lab tests are to be taken. On every checkup, clinical examination, Hb and urinstix are free of charge, and this tests should always be provided.

If we compare the antenatal care practise at the Mursan clinic with the recommendations from WHO, we see that the clinic keeps a good standard, with only a few exceptions.

The midwives are very friendly, and create a welcoming environment for the pregnant women. No woman is rejected at the clinic, at least she gets to talk with one of the midwives if she have any worries. Most of the antenatal care is free of charge, so that even poor women get some level of care. The woman's first visit at the clinic is normally during the fifth month of pregnancy, which is later than recommended by WHO, advising the first visit to occur during the first trimester. Very few women receive four checkups, but ideally the clinic follows the WHO setup during the checkups. Even though most women only get one or two checkups, most of them take all the tests needed and receive the needed vaccinations and iron/folic acid-treatment. If any complications occur during pregnancy, or something indicate that the baby should not be delivered vaginally, the woman is transferred to the district hospital in Hathras.

The practise in Mursan fails to follow the WHO standard in keeping a good record of antenatal care. WHO recommends a basic component checklist which should be used to record patient history, tests and interventions at each ANC visit. Going through the women's patient-cardex, we found that there were little information about the ANC visits, and the information was unsystematic and difficult to understand. No standard form was used at each visit. This makes it impossible to know what kind of information the woman received, which is an important factor to make the women deliver in a health facility.

Only part of the women who deliver in the clinic have been to any ANC. The midwives tell us that the number is a lot higher now, than 10 years ago, so advertising and telling local people about the services has been very successful. The staff observe that educated women are better in using ANC than their illiterate sisters, and that primigravidae come more often to checkup then multigravidae.

Our observations are confirmed in a big Indian study (15). NFHS-3's chapter about maternal health, confirm that among Indian mothers who gave birth in the five years preceding the survey, almost 75 % received antenatal care from a health professional (50 % from a doctor and 24 % from other health personnel). Younger women were more likely to receive ANC than older women, the same with educated women and women expecting their first child. Urban women went to more visits than rural. Less than 50 % received ANC during the first trimester of pregnancy. 22 % had their first visit in their fourth or fifth month. Just above half of the women had three or more visits.

Specifically for Uttar Pradesh, the numbers are a bit different. Of all the births in the last three years, 67 % of the mothers received ANC, this is a bit below the national line. Only 26,3 % of the mothers had three or more antenatal visits, and also here the urban women were more likely to have more visits than rural women. The number is raising from the last survey in 98-99, where only 14,6 % of the mothers had three or more checkups (15).



*Picture 6: Dr. Mamta and the midwives, Shantia and Roshni*

#### **6.4. Mursans's antenatal care in numbers**

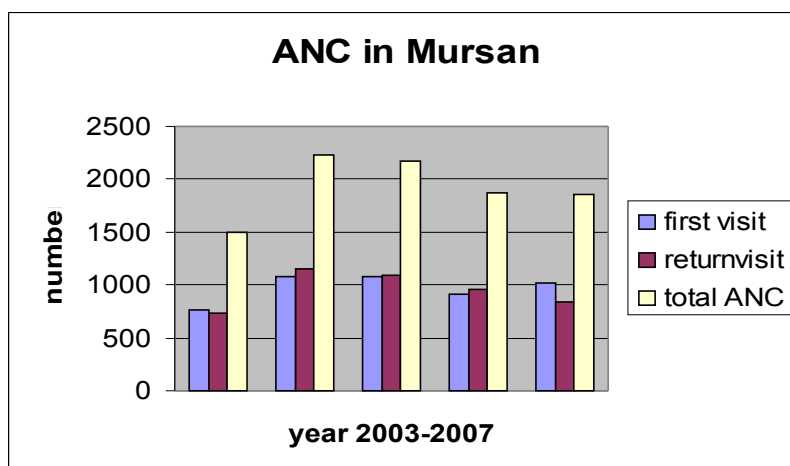
The director, Reidun Refsdal, provided us with statistical material from the clinics last five years, including information about antenatal services and deliveries.

**Table 2: Number of ANC in Mursan during the last five years:**

Year	First visit	Return visits	Total ANC-visits	No. of deliveries
2003	763	739	<b>1502</b>	310
2004	1074	1159	<b>2233</b>	314
2005	1083	1088	<b>2171</b>	298
2006	915	963	<b>1878</b>	316
2007	1017	836	<b>1853</b>	261

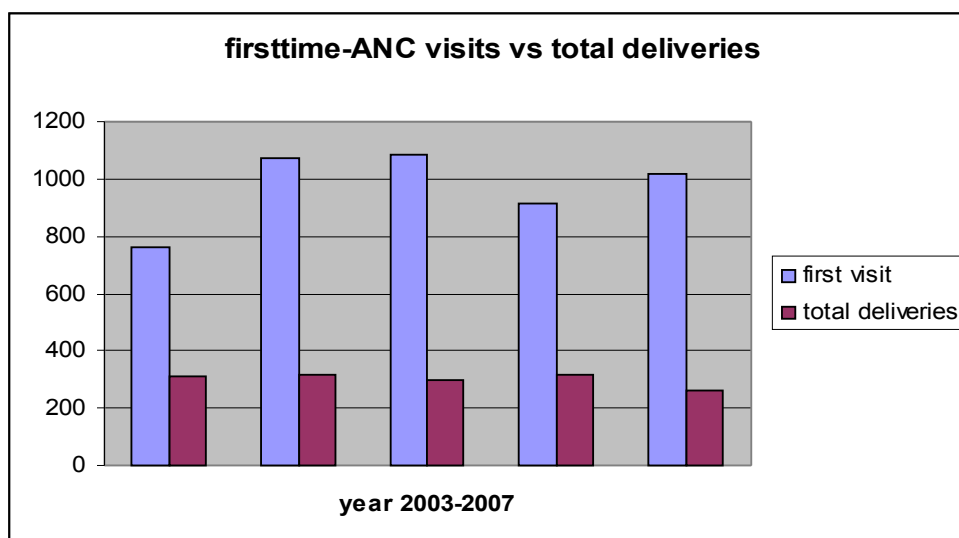
As we seen in the diagram below, the number of first time-visits is approximately the same as the number of return visits all together. This could either indicate that almost all women went to two checkups, or that some women went to several checkups, and the rest of them only received one antenatal checkup. Going through the patient-cardex from 2007, the latter seemed to be the fact. The total number of antenatal checkups in Mursan raised form 2003 to 2004, but after this the number has declined and the last years it have been around 1800 visits. It seems like the number of first time visits has been steady the last years, but as we can see in the graph, the orange column which indicates the number of return-visits, has decreased each year since 2004.

**Figure 2: No. of antenatal visits in Mursan year 2003-2007**



When we look at the total number of first time visits, it is possible to use this as a predictor of the total number of pregnant women who have received some level of antenatal care in the clinic during the year. If we compare this number to the total number of deliveries during the same year, we get the impression that above 50 % of the women who receive ANC at the clinic, choose to deliver another place, either at home or in another facility.

**Figure 3: Firsttime ANC-visits compared to total deliveries the same year**

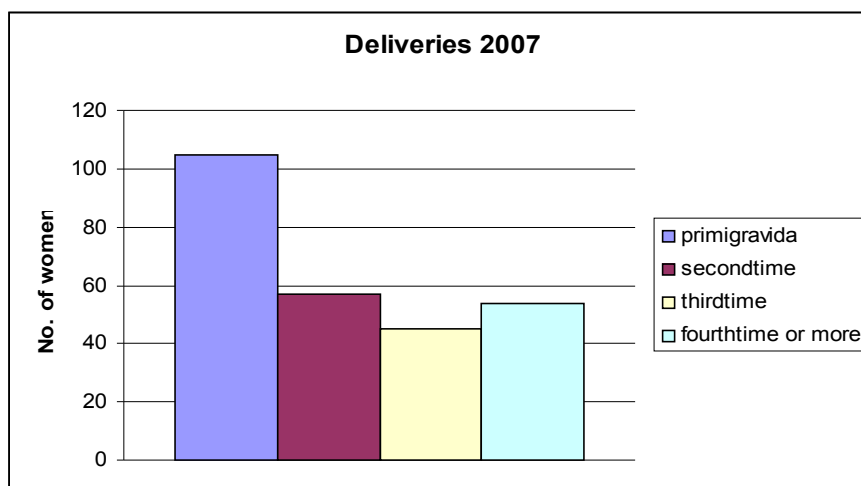


Why so many women do not deliver at the clinic where they received antenatal care, is an important question, which probably have a multifactorial answer. Traditions, economical problems and transport are important aspects. The clinic itself could also be a factor, it is important to make the women feel safe and welcome at the clinic. A plan for the delivery should be made in dialog with the woman. Everything should be done to make a woman deliver in a health facility, either at the clinic where she receives antenatal care, or another place where there are possibilities for professional health care.

### 6.5. Antenatal care and deliveries at the Mursan clinic during 2007

By looking through the patientcardex for all the women delivering in 2007, we identified which patients received any antenatal care. During 2007 the Mursan clinic had 261 deliveries. 17 of these cases lack information about the antenatal care given, so we only have information about 244 of the cases. All calculations below are made out according to this information. The primigravidae make out the largest group if we look at the delivery-population as a whole.

**Figure 4: Different parities among the deliveries at the clinic during 2007**



Does this correlate with the population receiving antenatal care the same year? In 2007 the Mursan clinic reports 1853 antenatal care checkups, out of these, 1017 were first-time visits, meaning that 1017 women received any level of ANC this year. We do not know how many of these women were primigravidae, so it is difficult to know if primigravidae more often receive ANC than multigravidae. But what we can do, is to take a closer look at the women delivering at the clinic this year.

**Table 3: Level of ANC received by the different parities in the delivery population:**

	Received 1 ANC-visit	Received 2 ANC visits	Received 3 ANC visits	Received 4 + ANCvisit	Total	Percentage
<b>Number of women</b>	28	15	12	18	73	100
First-time pregnancy	8	9	7	5	29	39,7
Second-time pregnancy	4	4	1	7	16	22
Third-time pregnancy	8	1	3	3	15	20,5
Fourth-time pregnancy +	8	1	1	3	13	17,8



As we can see in the information collected from the cordex of the women delivering at the clinic during the year 2007, only 73 of the 244 known cases had been to antenatal checkup at the clinic.

This makes out about 30 percent of the total group, meaning that 70 percent of the women delivering probably had no antenatal care during pregnancy. This is in agreement with the statistics from NHFS-3, saying that 67 % of the women delivering in Uttar Pradesh had no antenatal care during pregnancy. Only 18 women had four or more visits, as recommended by WHO. Primigravidae were more likely to have several checkups.

In the delivery-group which received ANC during 2007, first-time-pregnancies accounted for 39,7 %, second-time 22 %, third-time 20,5 % and those with four or more pregnancies accounted for 17,8 % of the group. The biggest group receiving ANC is women with first-time-pregnancies, with declining frequencies following a higher number of earlier pregnancies. If we compare this to the earlier mentioned percentages in the deliverypopulation as a whole, where primigravida made out 38,3 %, these numbers seems logical.

To see if the primigravidae actually are more likely to go to antenatal checkup, we have to compare the number of the different gravidas according to their ANC status:

**Table 4: Percentages of antenatal care among the women who delivered in 2007**

Group	Deliveries with information	No. receiving ANC (%)
No. of primigravida	100	29 (29 %)
No. of secondtime gravida	52	16 (30,8 %)
No. of thirdtime gravida	39	15 (38,5 %)
No. of fourthtime gravida	53	13 (24,5 %)
No info about ANC	17	
Total no. of deliveries with information	244	73 (30 %)

Of the 100 primigravidae, 29 women received some degree of ANC, in other words 29 %. Out of the 52 secondtime-gravidae, 16 women received ANC, this makes out 30,8 %. Out of the 39 thirdtime-gravidae, 15 women received ANC, this makes out 38,5 %. Out of 53 women with four or more pregnancies, 13 received ANC, in other words 24,5 %.

Surprisingly, this statistics shows that both second and third time gravidae who delivered at the clinic in 2007 were more likely to receive ANC than primigravidae. This differs from the statistics reported from NFHS-3, which states that women expecting their first child are more likely to receive antenatal care. The reasons behind this observation in the Mursan clinic are unknown, but one answer could be that women who received ANC and delivered their first baby at the clinic had a positive experience with the health facility, and decided to come again. It would be interesting to ask the second- and third-time gravidae in this group why they decided to receive antenatal care from the clinic. Possibly, this information could be used in the work of recruiting more women to these services.

## **7. COMPLICATIONS AT THE MURSAN CLINIC DURING 2007:**

### **7.1. Complications at the Mursan clinic in numbers:**

The following complications were recorded in 2007:

<b>COMPLICATION</b>	<b>No.</b>	<b>Percentage</b>
Hypertension /eclampsia	3	1,1 %
Malpresentations - Breech presentation (10 cases) - Face presentation (1 case)	11	4,2 %
Prolonged labour	2	0,7 %
Forceps delivery	16	6,1 %
Ventouse delivery	3	1,1 %
Injuries to the birth canal (total)	56	21,4 %
a) Perineal injuries	33	12,6 %
b) Vaginal injuries	7	2,7 %
c) Cervical injuries	15	5,7 %
d) Urethral injuries	1	0,4 %
Episiotomy	98	37,5 %
Meconium stained liquid	21	8,4 %
Asphyxic baby	14	5,4 %
PPH	28	10,7 %
MRP/Retained placenta	16	6,1 %
Stillbirth	4	1,5 %
Abortion/Curretage	2	0,7 %

**Table 5:  
Complications  
recorded in  
2007:**

Several of the complications occurred in the same patient, but were recorded separately.

Episiotomy is recorded as the most frequent complication, but as this is no 'real' complication, tears and lacerations actually were the most frequent complications during 2007. There were 56 injuries to the birth canal occurring in 54 out of 261 deliveries, in other words around 20 percent of the women suffered from these complications! Postpartum bleeding follows as the second most frequent complication, occurring in more than 10 percent of the deliveries this year.

Obstructed labour covers several of these complications, including at least breech presentation, vacuum extraction, forceps-assisted delivery and prolonged labour. These complications may be part of the same delivery, so it is difficult to put a percentage in this group. But all together, it is obvious that the Mursan clinic experience the same complications or five killers that women suffer from all over the world: bleeding, infection, hypertensive disorders, obstructed labour and unsafe abortion (10). The list above reflects these problems.

In the following pages we will go deeper into the different delivery-complications which have been reported in the clinic during 2007.

## **7.2. COMPLICATIONS AFTER HOME DELIVERIES:**

### **7.2.1. Home deliveries in India:**

According to the NFHS-3 three out of five births in India take place at home. Home deliveries are most common among women who received no antenatal checkups, older women, women with no education and women with more than three previous births (15).

Less than half of births took place with assistance from a health professional, and more than one third were delivered by a traditional birth attendant (TBA). There are great regional differences in India when it comes to delivery in a health facility. In Kerala and Goa nearly all deliveries take place in medical institutions, while in Uttar Pradesh, only 22% of births take place in a health facility (15). In Uttar Pradesh 27% of births during the past five years took place with assistance from a health professional and 40% were delivered by a traditional birth attendant. The remaining 33% were delivered by a relative or other untrained person (15). A disposable delivery kit was used for only 8% of home births, but a clean blade was used to cut the cord in 98% of home births (15).

Traditionally deliveries in India are assisted by a so called Dai, a traditional birth attendant. There have been made several surveys in India to examine their socio-demographic characteristics and practices. One of these studies was carried out by the Department of Community Medicine in Chandigarh. Two hundred TBAs were interviewed. The majority were age 45 or above (81%), illiterate (85%) and of low caste (78%). 27% had inherited the profession from older female relative (23).

### **7.2.2. Traditional Birth Attendant Training:**

Major efforts have been made to improve the knowledge and the skills of the TBAs and training of TBAs is considered an important way to reduce maternal and neonatal morbidity and mortality. Also the MRPHP have been greatly involved in this work, as the programme had a training project for TBAs in the period from 1990 to 2001. 10 226 TBAs went through the training during this period. After 2001 over 7600 of these TBAs have had a re-training course arranged by the MRPHP (5).

### **7.2.3. Complications after home deliveries at the Mursan clinic (6 cases):**

During 2007 there were six women who came to the Mursan clinic with complications after home deliveries. All of them had retained placenta which had to be removed manually, one had a vaginal tear, one had a third degree perineal tear and one had an urethra rupture and PPH in addition to her retained placenta. The latter was transferred to Hathras. None of the women had had any antenatal checkups.

There was also one woman who came in after an abortion of a five months fetus at home. She had curettage at the clinic.

Women often come in to the clinic quite late. During 2007 there were 11 women who came in with a ruptured membrane and two of them came in second stage of labour. Seven of these women had not had any antenatal checkups.

### **7.2.4. How to rise the number of institutional deliveries in India:**

Efforts are made as to raise the use of medical institutions both for deliveries and for antenatal and postnatal care. Today, Dais are persuaded to encourage pregnant women to seek care at health institutions. Since dais make their living from home deliveries, they are offered monetary incentives to take pregnant women to adequately equipped health centres (24).

In addition all over the country there are programmes for ASHA training. ASHA stands for Accredited Social Health Activist. The ASHA is meant to be an activist in the community who creates awareness on health, mobilizes the community towards local health planning and increased utilization of existing health services (24). The important roles of ASHA are (25):

As many of the women who chose to deliver at home are poor, there is a new BPL (below poverty line) programme for deliveries run by the Indian government. Families identified as BPL (by having a BPL card) are offered free antenatal care, IFA tablets and free delivery at a health centre. After delivery the family also gets 1400 rupees. An ASHA who has encouraged a BPL woman to deliver in a health institution gets 600 rupees (24).

The MRPHP was entitled to perform PBL deliveries in July 2008 (5).

### **7.3. HYPERTENSION IN PREGNANCY:**

Hypertension during pregnancy may be associated with one of several conditions (26).

- Pregnancy induced hypertension is a rise in blood pressure without proteinuria during the second half of pregnancy.
- Pre-eclampsia is associated with raised blood pressure and proteinuria. It usually presents after 20 weeks gestation and it is a condition unique to pregnancy.
- Eclampsia is a condition with convulsions in association with pre-eclampsia.
- Preexisting (or chronic) hypertension is known hypertension before pregnancy or raised blood pressure before 20 weeks gestation.

Pregnancy-induced hypertension affects 10% of pregnant women and pre-eclampsia complicates 2-8% of pregnancies (26). Eclampsia occurs in about 1/2000 in the western world. In resource-poor countries, estimates of the incidence vary from 1/100 to 1/1700 (26).

#### **7.3.1. Diagnosis of hypertensive disorders:**

Headaches, blurred vision, convulsions and loss of consciousness are often associated with hypertension in pregnancy, but are not necessarily specific to it (27). Other conditions that may cause convulsions or coma include epilepsy, complicated malaria, head injury, meningitis, encephalitis etc. Diastolic blood pressure is a good indicator of prognosis for the management of hypertension in pregnancy, as it measures peripheral resistance and does not vary with the woman's emotional state to the same degree that systolic blood pressure does.

Hypertension is diagnosed if the diastolic blood pressure is 90 mm Hg or more on two occasions minimum 4 hours apart. If hypertension occurs after 20 weeks of gestation, during labour and/or within 48 hours of delivery, it is classified as pregnancy-induced hypertension. If it occurs before 20 weeks of gestation, it is classified chronic hypertension (27).

The presence of proteinuria changes the diagnosis from pregnancy-induced hypertension to pre-eclampsia (as long as other causes of proteinuria, such as urinary infection, severe anaemia and heart failure are excluded).

Mild pre-eclampsia often has no symptoms, however increasing proteinuria is a sign of worsening pre-eclampsia (oedema of the feet and lower extremities is not considered a reliable sign). Mild pre-eclampsia may progress rapidly to severe pre-eclampsia (27).

The WHO has emphasized the importance of early detection and management of pregnancy induced hypertension. Women with risk factors should be followed up regularly and given clear instructions on when to return to their health provider (27).

### **7.3.2. Management:**

#### **Pregnancy induced hypertension:**

- Blood pressure, urine and fetal condition should be monitored weekly.
- If blood pressure worsens, the case should be managed as mild pre-eclampsia.
- If there are signs of severe growth restriction or fetal compromise, the woman should be admitted to hospital for possible expedited delivery.

#### **Mild pre-eclampsia (gestation less than 37 weeks):**

If the signs remain unchanged, the woman should be followed up twice a week.

- Blood pressure, urine and fetal condition should be monitored.
- The woman is to be advised to have additional periods of rest and to eat a normal diet (salt restriction should be discouraged).
- Anticonvulsants, antihypertensives, sedatives or tranquillizers should not be given.
- If the urinary protein level raises, the case should be managed as severe pre-eclampsia.

#### **Mild pre-eclampsia (gestation more than 37 complete weeks):**

- If there are signs of fetal compromise, delivery should be expedited (27).
  - o If the cervix is favourable (soft, thin, partly dilated), the membranes are to be ruptured and labour induced using oxytocin or prostaglandins.
  - o If the cervix is unfavourable (firm, thick, closed), the cervix is to be ripened using prostaglandins or a caesarean section is to be performed.

#### **Severe pre-eclampsia and eclampsia:**

- All cases of severe pre-eclampsia should be managed actively (27).
- Delivery must occur within 12 hours of onset of convulsions in eclampsia.
- During a convulsion, anticonvulsive drugs and oxygen at 4-6 L/min are to be given. If diastolic blood pressure is above 110 mmHg, antihypertensive drugs are to be given.
- IV fluids are to be infused while monitoring the amount of fluids administered and urine output to ensure that there is no fluid overload. The bladder is to be catheterized to monitor urine output and proteinuria. The development of pulmonary oedema is to be monitored.
- Delivery should take place as soon as the woman's condition has stabilized. Delaying delivery to increase fetal maturity will risk the lives of both the woman and the fetus. Delivery should occur regardless of the gestational age (27).
- In severe pre-eclampsia, delivery should occur within 24 hours of the onset of symptoms. In eclampsia, delivery should occur within 12 hours of the onset of convulsions.

### **7.3.3. Hypertension at the Mursan clinic (3 cases):**

There were very few cases of hypertension registered in the birth register of 2007. There was one case of hypertension, one case of pre-eclampsia and one case of eclampsia. The woman who had eclampsia and the woman who was registered with hypertension had no antenatal checkups, thus the hypertension was registered as the woman came in for delivery. The woman who had pre-eclampsia had five antenatal checkups where the blood pressure and the urinary protein level were monitored. All three pregnancies resulted in living babies delivered at term.

## **7.4. MALPRESENTATIONS:**

Malpresentations are all presentations of the fetus other than vertex (27):

- Breech presentation occurs when the buttocks and/or the feet are the presenting parts (27). 3% of all term pregnancies present as breech (28).
- Face presentation is caused by hyper-extension of the fetal head. On vaginal examination, the face is palpated. This presentation occurs in about 1:500 labours (28).
- Brow presentation is caused by partial extension of the fetal head. On vaginal examination, the anterior fontanel and the orbits are felt. The presenting diameter is mento-vertical (measuring 13,5 cm), which is incompatible with vaginal delivery. Engagement is usually impossible and arrested labour is common (27). If this presentation persists, delivery will only be achieved by CS. This is the least common malpresentation and occurs in about 1:2000 of labours (28).
- Compound presentation occurs when an arm prolapses alongside the presenting part. The prolapsed arm and the fetal head present in the pelvis simultaneously (27).
- Transverse lie and shoulder presentation occur when the long axis of the fetus is transverse. The shoulder is typically the presenting part (27). This is frequently reported as occurring in 1:300 deliveries, but few of these women will go into labour (28). If the woman is in early labour and the membranes are intact, external version should be attempted. If this fails, delivery should be carried out by CS (27).

An abnormal position or presentation may result in prolonged or obstructed labour (27).

The malpresentations that occur in our material are breech presentation and face presentation.

### **7.4.1. Breech presentation:**

#### **Definition:**

Breech presentation occurs when the fetal buttocks occupy the lower part of the uterus.

The three different types are extended (frank), flexed (complete) and footling.

The presentation may be due to fetal (congenital abnormality), placental (cornual or praevia), amniotic fluid (increased) or uterine (bicornuate or separate) factors (28). Provided that there are no complications (e.g fetal growth restriction, uterine bleeding, previous caesarean section, fetal abnormalities, twin pregnancy, hypertension, fetal death), external version should be offered to all antenatal women who have a breech presentation at or after 37 weeks (before 37 weeks a version is likely to revert back into breech presentation) (27). The frequency of breech presentation is high in preterm labour (27).

#### **Complications:**

- Increased risk of asphyxia from cord prolapse, cord compression (which is common during a breech vaginal delivery), placental detachment or arrested head (27).
- Mechanical difficulties in the delivery of the shoulders and/or the head: damage to the visceral organs or the brachial plexus can occur if traction is exerted (28).
- Birth trauma as a result of extended arm or head, incomplete dilatation of the cervix or cephalopelvic disproportion (27).
- Delay in the delivery of the head may occur with the larger fetus, leading to prolonged compression of the cord and asphyxia. An uncontrolled rapid delivery of the head may occur with smaller fetus. This predisposes to tentorial tears and intracranial bleeding (28).

The majority of breech presentations recognized antenatally in the western world are delivered by CS, to avoid these risks, but the most frequent cause of harm in breech labours is the failure to recognize and respond to CTG (cardiotocographic) abnormalities, rather than mechanical problems (28).

#### Breech delivery:

Problems are more likely to arise when trying to speed up the process by pulling on the baby (28) (“keep your hands off the breech”).

In most cases, full dilatation and descent of the breech will have occurred naturally. Once the buttocks have entered the vagina and the cervix is fully dilated, the woman can be told to bear down with the contractions (27). Once the anterior buttock is delivered and the anus is seen over the fourchette, an episiotomy can be cut (28).

If the legs are flexed, they will be delivered spontaneously. If extended, they may need to be delivered one at a time using Pinard’s manoeuvre (using a finger to flex the leg by the knee and then extend by the hip). With contractions and maternal effort, the lower body will be delivered (28).

As the anterior shoulder rotates into the anterior-posterior diameter, the spine or the scapula will become visible. A finger placed above the shoulder will help to deliver the arm. As the posterior arm/shoulder reaches the pelvic floor, it too will rotate anteriorly (in the opposite direction). Once the spine becomes visible, delivery of the second arm will follow (28). If possible one should let the arms disengage spontaneously one by one, and assist only if necessary (27).

The head is delivered using Mauriceau-Smellie-Veit manoeuvre: the baby lies on the obstetrician’s arm. The first and third fingers of this hand are placed on the baby’s cheekbones, and the second finger in the baby’s mouth to pull the jaw down and flex the head (28). Delivery occurs with first downward and then upward movement. If this provides difficulty, forceps needs to be applied (28).

#### **7.4.2. Face presentation:**

- In most cases the cause of the complete extension is not known, although it is frequently attributed to excessive tone of the extensor muscles of the fetal neck. Rarely, it may be due to a fetal abnormality such as a thyroid tumour (28).
- The presenting diameter is the submento-bregmatic, which measures 9,5 cm, approximately the same as the suboccipito-bregmatic (vertex) presentation. Despite this, engagement of the fetal head is late and progress in labour is frequently slow, possibly because the facial bones do not mould (28).
- It is diagnosed by palpating the nose, mouth and eyes on vaginal examination.
- Prolonged labour is common. Descent and delivery of the head by flexion may occur in the chin-anterior position (27). If descent is unsatisfactory, the baby should be delivered by forceps (27). If there is any concern about fetal condition, CS should be carried out (28).
- In the chin-posterior position, the fully extended head is blocked by the sacrum. This results in arrested labour (27). In this case, the baby should be delivered by Caesarean section (27).

#### **7.4.3. Multiple gestations:**

- About 1:80 pregnancies are multi-fetal (28).
- Indications for elective CS in twin pregnancy (28):
  - o Malpresentation of the first twin.
  - o Second twin larger than the first.
  - o Evidence for intrauterine growth restriction in one or both twins.
  - o Monoamniotic twins.
- Essentially, the lie and presentation of the second twin are not crucially important. However, planned CS will usually be performed if the first twin presents by the breech, and certainly if it is transverse (28).

#### **7.4.4. Malpresentations and multiple gestations at the Mursan clinic (11 cases):**

There were 11 cases of malpresentation at the Mursan clinic in 2007. This equals 4,2% of the deliveries. Ten of them were breech presentations and one was a face presentation. In three of the breech cases the baby was premature (6 gestational months in all three cases) and stillborn, one of the mothers had PPH. In addition there was one breech case with obstructed labour where the baby was macerated and the placenta had to be removed manually. This illustrates that breech is common in preterm labour.

All of the deliveries which resulted in a dead baby were with multiparia. Two of the women who had a breech delivery were primigravidae, the remaining women were multiparia, one delivering her ninth and one delivering her tenth child.

None of the deliveries were done by forceps or ventouse, and only three of the women had an episiotomy (the two primigravidae and one multiparia).

The complications to the seven deliveries that resulted in a living baby were as follows:

One woman had PPH and one of the babies had asphyxia. Only one of the women had had an antenatal checkup before delivery (the one who had PPH). One of the women delivered on the way to the clinic, but fortunately she had no complications.

The child in the face presentation case was the first of twins. This was the only multiple gestation case at the Mursan clinic in 2007. The second twin had a vertex presentation. The twin mother had PPH.

### **7.5. POOR PROGRESS IN LABOUR:**

#### **7.5.1. False labour:**

If the cervix is not dilated and there are no palpable contractions or infrequent contractions, the woman is in false labour (27).

#### **7.5.2. Prolonged latent phase:**

The diagnosis is made retrospectively. When contractions become regular and dilatation progresses beyond 4 cm, the woman is said to have been in the latent phase. If the woman has been in the latent phase for more than 8 hours and there is little sign of progress, a prolonged latent phase is present. If there has been no change in cervical dilatation and there is no fetal distress, the diagnosis should be reviewed as the woman may not be in labour.

If there has been a change in cervical dilatation, the membranes should be ruptured and labour induced using oxytocin or prostaglandins. If the woman has not entered the active phase after 8 hours of oxytocin infusion, a CS should be performed (27).

#### **7.5.3. Prolonged active phase:**

If there is a secondary arrest of cervical dilatation and descent of the presenting part in presence of good contractions, the woman is in prolonged active phase. If there is no sign of cephalopelvic disproportion or obstruction and the membranes are intact, they should be ruptured. If the contractions are inefficient (less than three contractions in ten minutes, each lasting less than 40 seconds), inadequate uterine activity is suspected. If the contractions are efficient, cephalopelvic disproportion, obstruction or malpresentation is suspected (27).



#### **7.5.4. Cephalopelvic disproportion:**

Occurs when the fetus is too big or the maternal pelvis is too small. This leads to secondary arrest of cervical dilatation and descent of the presenting part. Findings may be: large caput, cervix poorly applied to presenting part, oedematous cervix, ballooning of the lower uterine segment, formation of a retraction band or maternal and fetal distress. If labour persists in this condition, it may become arrested or obstructed. The best test to determine if the pelvis is adequate is trial of labour. Clinical pelvimetry is of limited value. If disproportion is confirmed, a CS should be performed. If the fetus is dead, delivery is done by craniotomy (27).

#### **7.5.5. Obstruction:**

If the fetus is alive, the cervix fully dilated and the head is at 0 station or below, a ventouse delivery is to be performed, if necessary with a symphysiotomy. If the fetus is alive but the cervix is not fully dilated or the fetal head is too high for vacuum extraction, a CS is to be performed (27).

#### **7.5.6. Inadequate uterine activity:**

If contractions are inefficient and cephalopelvic disproportion and obstruction have been excluded, the most probable cause of prolonged labour is inadequate uterine activity. Inefficient contractions are defined as less than three contractions in ten minutes, each lasting less than 40 seconds. This is more common in primigravidae than in multigravidae, therefore disproportion must be ruled out in a multigravida before augmenting with oxytocin.

When inefficient uterine activity is confirmed, the membranes are ruptured and labour is augmented using oxytocin. A vaginal examination is performed every second hour. If there is no progress between examinations, a CS is to be performed (27).

#### **7.5.7. Prolonged expulsive phase:**

In this condition, the cervix is fully dilated and the woman has the urge to push, but there is no descent. Maternal expulsive efforts increase fetal risk by reducing the delivery of oxygen to the placenta. Prolonged effort and holding the breath should not be encouraged. If malpresentation and obvious obstruction have been excluded, labour is augmented with oxytocin. If there is no descent after augmentation and the head is not more than 1/5 above the symphysis pubis, ventouse or forceps is to be applied. If the head is between 1/5 and 3/5 above the symphysis pubis, delivery is done by ventouse and symphysiotomy or by CS.

If the head is more than 3/5 above the symphysis pubis, a CS is to be performed (27).

#### **7.5.8. Prolonged labour at the Mursan clinic (2 cases):**

Only in two cases, there is an actual registration of prolonged labour in our material. One of the cases was a primigravida and the nature of delivery is described as “prolonged labour”. Her second stage is noted as 15 minutes. There was no instrumental assistance to the delivery which resulted in a living baby. The other case is registered as “obstructed labour”. The presentation was breech and the fetus was dead and macerated.

In addition to these cases, there were three women with the note “not able to push”. This may be interpreted as poor progress in labour. All three babies were delivered by forceps.

## **7.6. ASPHYXIC BABY (oxygendepressed baby):**

### **7.6.1. Definition and diagnosis:**

Most babies have a smooth transition from intrauterine to extrauterine life, making their first respiratory efforts within 10 seconds of birth. Fetal lungs are filled with «lung liquid» a fluid that is important for normal lung development and growth. During labour, the production of this liquid stops, and reabsorption begins. Lung liquid is squeezed out of the thorax during vaginal delivery. Finally, the baby takes his first gasp, establishing an air-liquid interface which moves rapidly down through the lungs. The last of the lung liquid are then absorbed by the lymphatic and the pulmonary capillaries. At the same time as the lungs are filled with air, the blood supply to them increases dramatically. Pulmonary flow is low in fetal life because a high resistance is actively maintained in the pulmonary capillaries. Immediately after birth the pulmonary vascular resistance starts to fall. The fall is driven by the release of vasoactive substances, including prostaglandins and NO, and by the presence of oxygenated blood in the pulmonary capillaries themselves (28).

Infants who fail to breathe after birth may do so as a result of:

- Deprivation of oxygen and blood supply to the brain before birth (hypoxia-ischemia or asphyxia)
- A central nervous system or muscle disease.
- Systematically illness/infection.

Assessment of the baby's condition in labour depends essentially on observations of the fetal heart rate. The presence of meconium in the liquor should always be noted, but this does not have to be a warning that there may be a problem. It is a known theory that fetal hypoxia leads to an increased vagal output, and this is stimulating the fetal gut and resulting in the passage of meconium (29).

According to WHO, meconium staining of amniotic fluid is seen frequently as the fetus matures and by itself is not an indicator of fetal distress. A slight degree of meconium without fetal heart rate abnormalities is a warning of the need for vigilance. Thick meconium suggests passage of meconium in reduced amniotic fluid and may indicate the need for expedited delivery and meconium management of the neonatal upper airway at birth to prevent meconium aspiration. In breech presentation, meconium is passed in labour because of compression of the fetal abdomen during delivery. This is not a sign of distress unless it occurs in early labour (27). Meconium can be aspirated before or after birth, and the baby can develop the meconium aspiration syndrome (MAS). Meconium in the airways creates a ball-valve effect in which the air can be sucked past the obstruction but not exhaled past it, and the substance acts as a chemical irritant to the airways. It is very important to remove all meconium from the baby's mouth and nose, to prevent it from inhaling it (28).

At birth, the asphyxiated baby may suffer from primary apnoea or terminal apnoea.

Primary apnoea: the baby is cyanosed, with some muscle tone and a heart beat over 100. Efforts of breathing are made and gasping occurs.

Secondary apnoea: is also called terminal apnoea because if not soon corrected brain damage or death will follow. The skin is greyish-white, and there is no muscle tone and the heartbeat is less than 100. There is associated hypotension which is poorly tolerated by infants.

A baby in terminal apnoea is unlikely to recover without intubation and positive pressure ventilation, whereas a baby with primary apnoea can auto-resuscitate by gasping and respond quickly to simple resuscitation (29).

There are multiple causes of apnoea:

- Antenatal: any condition leading to fetal hypoxia, such as placental insufficiency, preeclampsia, placental abruption.
- Intrapartum: prolonged labour, traumatic delivery, opiate drugs, anaesthesia
- Postnatal: immaturity, cerebral trauma, congenital abnormalities

All professionals who attend deliveries should be able to recognize when a baby is not establishing normal respiration and circulation, and be trained to initiate resuscitation. Some types of deliveries should always have a specific trained neonatal resuscitator should present, like: preterm deliveries, breech, meconium stained liquid, significant fetal distress, haemorrhage, forceps or vacuum deliveries, C.S and multiple deliveries.

#### **7.6.2. The APGAR score:**

**The Apgar score** (30) is a tool which assists in the recognition of an infant who is failing to make a successful transition to extrauterine life. The original Apgar score includes:

- Appearance (central trunk colour: white/blue:0, peripheral blue: 1, pink: 2).
- Pulse rate (absent:0 , <100 bpm:1 , >100 bpm: 2).
- Grimace (response to stimulation, nil:0 , grimace:1, cry or cough: 2).
- Activity (muscle tone: flaccid:0 , some flexion:1, well flexed, active movement: 2).
- Respiratory effort (absent: 0, gasping or irregular: 1, regular or strong cry: 2).

This evaluation should be made after one minute, and again after five minutes.

A score above 7 indicates good condition, a score of three or less at one minute indicate the need for full resuscitation which may include external cardiac massage, intubation and ventilation. A score of six and less at five minutes suggest perinatal asphyxia. Most infants will establish respiration within three minutes of birth.

#### **7.6.3. Management of the newborn baby:**

The cord should be clamped and cut as soon as pulsations have ceased. If ligation is done carelessly, the baby may lose a great deal of blood very quickly.

All mucus, blood and meconium must be sucked out of the pharynx and nose before the baby inhale them. This should be done using mechanical suction to minimise the risk of virus transmission. The baby's colour and breathing should be checked every 5 minutes.

The baby should be dried to reduce heat loss by evaporation, and covered with a warm towel, and be placed in skin contact with the mother, if possible (27).

If needed, an oxygen mask should be held over the face, to enrich any breath that is taken.

If this is not enough, effective bag and mask ventilation must be given, and if necessary, the baby must be intubated. If bpm falls below 80, cardiac massage should be given, and correction of acidosis, reversing any depressing effect of opiates, and treatment of hypothermia must be performed if necessary. All infants should be given vitamin K i.m. or orally immediately after birth to prevent haemorrhagic disease (28). When the situation is stable, the baby should be inspected for congenital defects, and normal reflexes.

The importance of bonding between mother and child is widely recognised, and ideally the baby should be offered a period of skin-to-skin contact with the mother after delivery, as this also improves the breastfeeding. The infant should be offered breast as soon as possible after birth. Separation of mother and baby should be avoided, and the two should never be left unattended at any time (27). 6-8 hours after delivery, traditionally, the baby is bathed and dressed, and placed in a cot in room temperature between 18 and 20. The baby should be placed close to its mother (28).

#### **7.6.4. Management of the newborn baby at the Mursan clinic:**

At the Mursan clinic, the baby was taken out of the delivery room as soon as the cord was clamped and cut, mouth suction was done, and the baby had cried.

If there were no complications, the 4 months students were responsible for the baby. The baby was taken to a small room, with a high temperature, and mucus was cleaned off with cotton and oil. If necessary, a more thorough suction of the mouth and nose was performed. After this, the baby was given a bath straight away, and washed all over with soap and water, before it was dried and covered with talcum. This was performed in the hall outside the delivery room, and the temperature in the room depended on the outdoor temperature. The cord was covered with an antiseptic pad, and the baby's eyes were dripped with antibiotics. Two drops of polio-vaccine was given orally. The baby's length and weight was measured, and it was dressed with a cotton diaper and a cotton shirt, and wrapped in a clean towel. The baby was finally examined by one of the doctors, and then left with one in the family until the mother is ready to see it. The baby normally had no contact with its mother the first hour after birth.

If there were any complications, the baby was taken care of by one of the doctors, and resuscitation was performed. If sufficient care could not be given at the clinic, the baby was transported to the district hospital, in Hathras. This happened once during our six weeks in the hospital.

During 2007, the birth register reported **14 cases of asphyxic babies**. In other words 5,4 % of the babies delivered at the clinic this year was asphyxic.

- In three of the cases it was specified that the mother was not able to push.
- One mother had weakly reactive VDRL test.
- One was a breech delivery.
- In five of these cases the complication of meconium stained liquid was also noted.
- One of the babies was sent to Hathras for further treatment.
- Only two of the mothers had been to antenatal care.

There were **21 cases of meconium stained liquid** during 2007, included the five cases above. Six of these had been to at least one antenatal checkup. Two had weakly reactive VDRL tests.



*Figure 7: Student and midwife give care to a neonate.*

## **7.7. INSTRUMENTAL VAGINAL DELIVERY (Assisted delivery):**

### **Definition:**

Delivery of a baby vaginally using an instrument for assistance (28).

There are great differences in the frequency of instrumental deliveries worldwide; it is performed in about 1,5% of deliveries in the Czech Republic and in 15% of deliveries in Australia and Canada (28).

At the Mursan clinic there are two techniques that are used: forceps delivery and ventouse delivery.

The forceps is by far most common, as the midwives and doctors performing the instrumental assisted deliveries at the clinic have more experience in using this technique.

Current evidence suggests that when assisted vaginal delivery is required, the ventouse should be chosen first, because it is significantly less likely to injure the mother (28).

### **7.7.1. Ventouse delivery:**

#### **Definition:**

Assisted delivery using a suction cup that is attached to the head of the baby. Traction is then applied slowly. The "Bord-modification" cups that are widely used have a central traction chain and a separate vacuum pipe. There are two types of cups: anterior and posterior. The latter is designed to be inserted higher up in the vagina than the anterior ones. This is to allow correct placement over the occiput when the head is deflexed (28).

The cup should be applied in the midline over the occiput. Failure to put the cup far enough back will result in deflection (28).

#### **Indications for delivery with ventouse:**

- Delay in the second stage.
- Fetal distress in the second stage.
- Maternal conditions requiring a short second stage.

#### **Contraindications:**

- Face presentation.
- Gestation less than 34 weeks.
- Marked active bleeding from fetal blood sampling site.

#### **Basic rules for delivery with the ventouse:**

It is important that the cervix is dilated and that the head is fully engaged before the ventouse is applied. Good contractions should be present and the patient should be able to cooperate.

- The delivery should be completed within 15 minutes of application.
- The head (not just the scalp) should descend with each pull.
- The cup should be reapplied not more than twice. If failure with the correct placed ventouse occurs despite good traction, the forceps should not be tried as well (28). With good technique the risk of complications to mother or baby is small. Trauma to the genital tract is the most common complication. Most babies will have a chignon (oedematous skin bump) at the site of the cup application. Rare serious intracranial injuries will be more likely to occur if multiple attempts at delivery are made, especially if a variety of instruments is used (28).

### **Ventouse at the Mursan clinic (3 cases):**

There are only three cases of ventouse delivery in our material, and all were performed by the same doctor. One was performed with an episiotomy.

Two of the mothers were primigravidae and one a multipara.

The indication for the use of ventouse in each case is not noted explicit in the clinic's registry system. Most probably the indication has been poor progress of labour in all three cases, as second stage lasted for 15 minutes, 20 minutes and 54 minutes.

The second stage of delivery is defined as the time from full dilatation of the cervix to the delivery of the baby. Conventionally the second stage should not last longer than 2 hours in a primigravidae and 1 hour in multiparae (28). In this perspective the second stage is not prolonged in our cases, but the second stage may also be subdivided into two phases: a passive phase where the woman has no urge to push and the head of the baby is still high in the pelvis, and an active phase where the head is low and there is a maternal urge to push (28). At the Mursan clinic the second stage registered in the delivery register refers to the active second stage. The mean duration of the second stage as it is registered in the delivery register is 8,5. Furthermore, a frequent cause of poor progress in labour is inadequate uterine activity, which may have been an indication.

All three deliveries resulted in a living baby, even though the one with the longest second stage was in need for resuscitation after delivery and was soon after sent to a paediatric unit in Hathras. In this case there was also meconium stained liquid, MSL, as a sign of fetal distress.

Two of the women had a trauma to the genital tract, e.g a perineal tear as a complication to the procedure. Both of them also had PPH. The episiotomy was performed on one of these women, but failed to prevent the tear. One of the women had no complications.

In addition to these three ventouse deliveries there was one failed attempt to deliver by ventouse. In this case, the baby was delivered by forceps.

### **7.7.2. Forceps delivery:**

#### **Definition:**

The delivery is assisted by an obstetrical forceps. There have been many variations in the design of the forceps, but today a so called low forceps (with short hanks) is most common.

#### **Indications:**

- Face presentation.
- Bleeding from fetal blood sample.
- After-coming head of the breech.
- Delivery before 34 weeks' gestation.

#### **Technique:**

- The head should be fully engaged on abdominal palpation. This is particularly important with face presentation (which will appear to be engaged on vaginal examination some time before the head is actually engaged) (28).
- In general catheterization and an episiotomy are required for a forceps delivery (28).
- The left-handed blade is applied first (27).
- Difficulty in locking the blades usually indicates that the application is incorrect. In this case, the blades should be removed and the position of the head should be rechecked. If rotation is confirmed, the blades may be reapplied (27).
- After locking, a steady traction inferiorly and posteriorly is to be applied with each contraction (27). If the head does not descend, the station may be higher than first thought or the position may be occipito-posterior (28).

#### Complications:

Tears of the genital tract may occur (27). These are often the result of undue traction or rotatory forces (28). Serious injuries to the baby can occur when excessive force is used or when multiple attempts are made (28).

#### **Forceps at the Mursan clinic (16 cases):**

There were 16 low forceps deliveries in the Mursan clinic in 2007, 12 of them in primigravidae and 4 in multipara. Only one of them was performed without an episiotomy (in a multipara).

Three of the women who delivered by forceps are registered as “not able to push” in the delivery register. This may have led to poor progress in labour and which may have been the indication for the use of forceps in these cases. Two of their babies had asphyxia.

In seven cases there are indicators of fetal distress that may have led to the decision to deliver by forceps: meconium stained liquid in two cases, and asphyxia in the baby in five cases (two of these were also “not able to push”). One woman had eclampsia and another delivered by forceps 15 days after term.

One woman delivered by forceps after failed ventouse application.

For the remaining 5 women there is no information in the register that may suggest the indication for the use of forceps, but three of them had a duration of the second stage clearly longer than the mean 8,5 minutes (20, 15 and 43 minutes).

All of the forceps deliveries resulted in living babies, although five of them were asphyxic, and the rate of maternal complications was relatively low.

One of the women had a vaginal rupture, one had a vaginal laceration and PPH, the woman with eclampsia also had PPH and so did another woman who had previously had a LSCS.

#### **7.7.3. Caesarean section:**

Transabdominal delivery is not performed at the Mursan clinic, due to the lack of an anaesthesiologist and anaesthesiological facilities. Women in obstructed labour who are not likely to have complications caused by transport are sent to the regional hospital in Hathras.

### **7.8. INJURIES TO THE BIRTH CANAL**

The injuries to the birth canal occurring in our material are as follows:

- Perineal injuries.
- Vaginal tears.
- Cervical tears.
- Urethra rupture.

**There were 56 injuries to the birth canal occurring in 54 out of 261 deliveries** at the Mursan clinic in 2007, in other words around 20 percent of the women suffered from these complications! The women who had an episiotomy are excluded from this number.

#### **7.8.1. Perineal injuries:**

##### Definition:

Perineal trauma is any damage to the perineum that occurs spontaneously or intentionally by surgical incision (episiotomy). Anterior perineal trauma is injury to the labia, anterior vagina, urethra and clitoris, and is usually associated with little morbidity. Posterior perineal trauma is any injury to the posterior vaginal wall, perineal muscles or anal sphincter (26).

There are four degrees of perineal injuries that can occur during delivery:

- 1) First degree tears involve the perineal skin only (26).
- 2) Second degree tears involve the perineal muscles and skin (26). This includes episiotomy (28)
- 3) Third degree tears involve the anal sphincter complex (classified as 3a where less than 50% of the external anal sphincter is torn; 3b when more than 50% of the external sphincter is torn; 3c when the internal and external anal sphincter is torn) (26).
- 4) Fourth degree tears involve the anal sphincter complex and rectal mucosa (26)

Over 85% of women giving birth will sustain perineal trauma and 60-70% require stitches (26). The majority of these women experience perineal pain in the period following delivery, but about 20% will have long term problems such as dyspareunia. If the repair is performed inadequately, it may leave women suffering from perineal pain, which they describe as being worse than the pain of childbirth (28).

Third degree tears affect a relatively small number of women. Overall, long term incontinence affects 5 % of women (28).

Associated risk factors (26):

Perineal injury is usually more extensive after the first vaginal delivery. Other associated risk factors include:

- Increased fetal size
- Malpresentation/ malposition of the fetus.
- Ethnicity (white women at greater risk than black)
- Older age
- Abnormal collagen synthesis
- Poor nutritional state
- Instrumental delivery (e.g forceps delivery)
- Previous sutured trauma.

Alternative positions of the woman during labour may prevent perineal injury, e.g kneeling, supported squat or all fours. An upright position may allow the presenting part to descend and stretch the perineum gently. The presence of a caring companion reduces the risk of both episiotomy and perineal trauma (28).

L. Alberts et al. who performed a randomized clinical trial of perineal management techniques in New Mexico in 2006, found that risk factors for trauma in women who had a first vaginal birth, were maternal education of high school or beyond, Valsalva pushing, and infant birth weight. Risk factors in women having a second or higher vaginal births were prior sutured trauma and infant birth weight. For all mothers, delivery of the infant's head between contractions was associated with reduced trauma to the genital tract. The group concluded that delivery technique that is unrushed and controlled may help reduce obstetric trauma in normal, spontaneous vaginal births (31).

#### **7.8.2. Management of perineal injuries:**

A recent tear should be repaired immediately following the delivery of the placenta. This reduces the risk of infection and minimizes the blood loss (32).

In cases of delay beyond 24 hrs the repair is to be withheld. Antiseptic dressing is prescribed and the wound is allowed to heal by granulation tissue or repaired after the infection is controlled (32).

Most first degree tears close spontaneously without sutures (27), and others will simply require one or two interrupted sutures.



A loose, continuous, non-locking suture technique to appose each layer (vaginal epithelium, perineal muscle and skin) is associated with less short term pain and need for suture removal compared to the traditional interrupted method (28). A too tight suturing can lead to significant later discomfort (28). The repair is to be started 1 cm above the apex of the tear (27). Missing the apex of the tear or episiotomy may allow continued bleeding or development of a paragenital haematoma (28).

- Complete tear (3<sup>rd</sup> degree):
  - o The rectal and anal mucosa is first sutured from above downwards.
  - o Muscle walls including the pararectal fascia are then sutured.
  - o The turn ends of the sphincter ani externus (exposed by Allis forceps) are reconstituted. Thus a third degree tear is converted into a second degree.
- Incomplete tear:
  - o The vaginal mucosa is to be sutured first. The first suture is placed at the apex of the tear. Thereafter the vaginal walls are apposed from above downwards till the fourchette is reached. The sutures should include the deeper tissues to obliterate the dead space.
  - o Repair of the perineal muscles is done. While the deeper tissues are apposed by 2-3 sutures, the rectum is pressed backwards by the index finger of one hand. A second layer of superficial sutures may be placed.
  - o At last the perineal skin is apposed (27).

The WHO have emphasized the importance of using absorbable sutures for closure (27).

A recent Cochrane review produced by Kettle et al, shows that the continuous suturing techniques for perineal closure, compared to “traditional” interrupted methods, are associated with less short-term pain. Moreover, if the continuous technique is used for all layers (vagina, perineal muscles and skin) compared to perineal skin only, the reduction in pain is even greater. Therefore, the non-locking continuous suturing technique is recommended for repair of vagina and perineal muscles with a continuous subcutaneous stitch to close the perineal skin (33).

### **7.8.3. Perineal injuries at the Mursan clinic (33 cases):**

In our material, 33 women had perineal injuries.

- Six of them are registered as “perineal lacerations”.
    - o One of the women had a low forceps delivery with an episiotomy.
    - o Another woman – a primigravida – had a normal delivery with an episiotomy. The remaining four women did not have an episiotomy.
  - 27 women are registered with perineal tears.
    - o 5 are registered as “slight tear”,
    - o 8 of them only as “tear”, two of which had a ventouse delivery and PPH afterwards.
    - o 8 women had a 1<sup>st</sup> -degree tear and one of these women had PPH afterwards.
    - o 5 patients had a 2<sup>nd</sup> -degree tear and one had a 3<sup>rd</sup> -degree tear after home delivery.
- None of the 27 women had an episiotomy.

#### **7.8.4. Vaginal injuries:**

Isolated vaginal tears/lacerations without involvement of cervix or the perineum are not uncommon. These are usually seen following instrumental or manipulative delivery. In such cases, the tears are extensive and often associated with brisk hemorrhage.

The tears may extend to any direction either limited superficially or extend deep into the paravaginal tissues (32).

The tears are repaired by sutures. Haemostasis may be achieved by intravaginal plugging by roller gauze soaked with glycerine and acriflavine (the plug is to be removed after 24 hrs) (32).

#### **7.8.5. Vaginal tears and lacerations at the Mursan clinic (7 cases):**

At the Mursan clinic, seven women had a vaginal tear during 2007, and six of them were primigravidae. Two had low forceps deliveries, both with episiotomies, one of which had PPH afterwards. Another woman, who did not have an instrumental delivery, also had PPH. One of the women had a vaginal tear and retained placenta which had to be removed manually after a home delivery.

#### **7.8.6. Cervical injuries:**

The majority of women will have lacerations or bruising of the cervix after a vaginal delivery. Minor cervical lacerations usually remain undetected (28). Bleeding which does not appear to be arising from the vagina or perineum and which continues despite of a well-contracted uterus is an indication for examining the cervix. Deep lacerations, especially those that involve the vaginal vault, need to be managed surgically under anesthesia (28).

A laceration into the vault could extend forward to the bladder, laterally towards the uterine artery or to the base of the broad ligament (28). A lateral laceration may lead to severe PPH if the artery is involved or to broad ligament haematoma. Tears to the birth canal are the second most frequent cause of PPH. Tears may coexist with atonic uterus. Postpartum bleeding with a contracted uterus is usually due to cervical or vaginal tears (27).

Ventouse prior to full dilatation has been implicated in injury to the cervix (28).

#### **Treatment:**

An assistant should be asked to massage the uterus and provide fundal pressure. The cervix is grasped with ring or sponge forceps. The forceps is to be applied on both sides of the tear. A gentle pull in various directions will expose the entire cervix. This is important, as there may be several tears. The cervical tears are to be closed by continuous sutures starting at the apex, which is often the source of bleeding (27).

If the apex is difficult to reach and ligate, it may be possible to grasp it with artery or ring forceps, which is then left in place for four hours. After this the forceps is partly opened but not removed. After another four hours it is removed completely (27).

A laprotomy may be required to repair a cervical tear that has extended beyond the vaginal vault (27).

#### **7.8.7. Cervical injuries at the Mursan clinic (15 cases):**

During 2007, 15 women had a cervical tear at the Mursan clinic, 9 of them had an episiotomy (all of them primigravidae). Only one of these 14 women had had any antenatal checkups. One of the women had two previous LSCS. According to the register, the risk of vaginal delivery was explained to the patient. She was not in state for transfer. 3 of the women had PPH. One had a perineal tear in addition to her cervical tear.

### **7.8.8. Visceral injuries (1 case):**

#### **Bladder:**

Obstetrical injury to the bladder may be due to:

- Instrumental vaginal delivery.
- Abdominal operation such as hysterectomy.
- Sloughing fistula resulting from prolonged compression effect on the bladder between the head and symphysis pubis in obstructed labour (32)

#### **Urethra:**

Injury may be traumatic resulting from instrumental delivery or during tubotomy. It may also be ischemic sloughing similar to the sloughing fistula of the bladder (32).

At the Mursan clinic, one woman had a urethra rupture, retained placenta and PPH after home delivery in 2007.

Another important injury to the birth canal is rupture of the uterus. Fortunately there were no such cases at the Mursan clinic in 2007.

## **7.9. EPISIOTOMY:**

As episiotomy is a surgical intervention, we have included the procedure in the list of complications occurring in our material, even though it may not be considered as a complication by Indian health workers. The intervention is the most common “complication” in the material.

In this section, we have chosen to use Dutta’s textbook as a source of information to a greater extend than elsewhere in our text. The reason is that the practice at the Mursan clinic is consistent with the theory and management guidelines presented in Dutta’s text.

### **7.9.1. Definition:**

Episiotomy is a surgical incision of the perineum made to increase the diameter of the vulval outlet during childbirth. It is the most common obstetric operation (32). The aim is:

- to enlarge the vaginal introitus so as to facilitate easy and safe delivery
- to minimize overstretching and rupture of perineal muscles and fascia
- to reduce stress and strain on foetal head (32).

#### **Indications for an episiotomy are as follows:**

The WHO guidelines request that an episiotomy should only be considered in the case of:

- Complicated vaginal delivery
  - o Breech presentation.
  - o Shoulder dystocia.
  - o Instrumental delivery (forceps, ventouse).
- Scarring from female genital cutting or poorly healed third or fourth degree tears.
- Fetal distress (27).

#### **Advantages:**

According to Dutta, there may be several advantages in performing an episiotomy if clear indications are present. It provides a clear cut through non-traumatized tissue which is easy to repair and heals better than an uncontrolled tear (32). The procedure also provides a shortening of the second stage of labour (32).

### **7.9.2. Performing the episiotomy:**

Timing is important as a too early intervention will give a greater blood loss and with a too late one, the patient is in risk of already having lacerations (32). The episiotomy must be made in one single cut. If it is enlarged by several small cuts, a zigzag incision line will be produced which will be difficult to repair (28).

Prior to the incision, antiseptic solution is applied and the perineum is infiltrated with local anaesthetic. Two fingers are placed in the vagina between the presenting part and the posterior vaginal wall. The scissor is placed between the fingers. The incision should be made at the height of a contraction just prior to crowning when the perineum is maximally stretched (27).

There are three different techniques that are widely used:

- The midline episiotomy which is cut vertically from the fourchette down towards the anus (this technique is widely used in USA), and
- The mediolateral episiotomy which starts in the midline position at the fourchette and then is directed diagonally outwards to avoid the anal sphincter. This technique is standard in the UK (28). It is also the technique used in our material.
- A J-shaped midline cut is also used by some practitioners (32).

Repair is done soon after the delivery of the placenta. Prior to repair the site is cleaned with antiseptic solution and blood clots from vagina and the wound are removed.

Repair is done in three layers:

1. Vaginal mucosa and submucosal tissue.
2. Perineal muscles.
3. Skin/subcutaneous tissue.

### **Complications:**

Immediate complications include:

- Rectum involvement.
- Haematoma.
- Infection.
- Wound deficiency.

Remote complications include:

- Dyspareunia.
- Scar endometriosis.
- Laceration in subsequent labour (32).

### **7.9.3. Episiotomy at the Mursan clinic (98 cases):**

At the Mursan clinic, episiotomy is a widely used procedure, especially in primigravida.

Of the 261 deliveries registered at the clinic in 2007, 106 were primigravidae. Only 17 of them did not have an episiotomy. Totally 98 women had an episiotomy in 2007.

The relevant indications for episiotomy in the cases of 2007 include:

- Instrumental or breech delivery:
  - o Low forceps: There were 15 low forceps deliveries in 2007 and 14 of them were performed with an episiotomy (12 of the mothers were primigravidae).
  - o Ventouse: 3 vacuum suctions were performed in 2007, one of these with an episiotomy.
  - o Breech: There were 10 breech deliveries at the clinic in 2007, 3 of them with an episiotomy (two in primigravidae and one in multiparae).

- Fetal distress:  
As we have no registrations of fetal distress as such, we have chosen to use muconium stained liquid (MSL) and asphyxia (in the baby) as indicators of fetal distress.
  - o There were 5 cases of MSL among the 74 mothers who had an episiotomy without instrumental or breech delivery. This may have been the indication for the episiotomy. In two of these cases the baby was also asphyxic after delivery.
  - o Asphyxic baby: there were 6 cases of asphyxia among the 74 mothers (including the two mentioned under MSL).
- Prolonged labour:  
Shortening of the second stage of labour is considered an advantage of performing episiotomy – especially when labour is prolonged (32). There was one case of prolonged labour among the 74 mothers.
- Premature baby: Episiotomy may minimize intracranial injuries in premature babies (32), according to this prematurity may be an indication for an episiotomy.

Still we are left with 63 primigravidae who had an episiotomy without clear indication, showing that there is a routine use of episiotomy in primigravidae at the Mursan clinic.

We define a normal delivery in our material as a delivery with no registered complications whatsoever. We include the cases registered as normal deliveries with episiotomy as the only “complication” (and thereby also exclude complications that have no relation to an eventual episiotomy), and find that there are registered 85 normal deliveries without an episiotomy (3 of them in primigravidae) and 45 normal deliveries with an episiotomy (42 in primigravidae and 3 in multipariae).

All together there are 130 normal deliveries registered in the delivery register of 2007 from the Mursan clinic. The episiotomy rate in this group is 34,6 % while WHO recommends an episiotomy rate of 10% for normal deliveries (28). If we only consider the primigravidae, the episiotomy rate for normal deliveries is nearly 94 %.

At the end of the twentieth century it was thought that all primigravidae should have an episiotomy to protect the fetal head and the pelvic floor. By the 1970s episiotomy rates were as high as 90% (28). Further research carried out over the last 20 years has shown the problems associated with the procedure, which include unsatisfactory anatomical results, increased blood loss, perineal pain and dyspareunia. These studies have concluded that the routine use of episiotomy should be abandoned (28).

“Episiotomy is no longer recommended as a routine procedure. There is no evidence that routine episiotomy decreases perineal damage, future vaginal prolapse or urinary incontinence. In fact, routine episiotomy is associated with an increase of third and fourth degree tears and subsequent anal sphincter muscle dysfunction.” (27)

#### Complications:

19 of the women who had an episiotomy at the Mursan clinic in 2007 had infection in their stitches, 17 of them were primigravidae and 2 were multipariae.

## **7.10. POSTPARTUM HAEMORRHAGE (PPH):**

### **7.10.1. Definition:**

The definition of postpartum haemorrhage is: "blood loss in excess of 500 ml following birth"(28), but this definition is not always good. Estimates of blood loss are often too low, often half the actual loss. The importance of a given volume of blood varies with the woman's haemoglobin level. A better definition could be "any amount of bleeding from or into the vaginal tract following birth which adversely affects the general condition of the patient evidenced by rise in pulse and fall in blood pressure." (27)

The postpartum bleedings can be divided into two categories: (29)

Primary haemorrhage: within 24 hours following the delivery. Majority occurs within two hours.

-Third stage haemorrhage - before expulsion of placenta

-True postpartum haemorrhage - subsequent to expulsion of placenta

Secondary haemorrhage: beyond 24 hours and within puerperium, also called delayed or puerperal.

PPH is one of the life threatening emergencies in the third stage of labour, and it is responsible for almost 25 % of maternal deaths, especially in the developing countries (6). Prevalence of malnutrition and anaemia, inadequate antenatal and intranatal care and lack of blood transfusion facilities are some of the important contributing factors (32).

Principles of treatment are «stop bleeding, replace lost fluid and treat circulatory failure» (32).

### **Causes of postpartum haemorrhage (28):**

- Atonic uterus (this accounts for 90 % of the cases)
- Cervical or vaginal trauma
- Tears affecting perineum
- Hidden bleedings: paravaginal bleeding, uterus rupture.
- Retained pieces inside the uterus

### **7.10.2. Management of third stage bleeding (bleeding before placenta is delivered)**

The bleeding can either be from the placental site, or from a traumatic injury anywhere in the birth canal. If one suspects a placental site bleeding, the uterus should be massaged up to a contraction. If bleeding continues when uterus contracts, a genital tract injury should be suspected.

If features of placental separation are evident, the mother should try to expel the placenta, while the health personnel apply steady cord traction. If features are not evident, manual removal under general anaesthesia should be done.

### **7.10.3. Management of true PPH (bleeding after placenta delivery)**

There are several causes of true PPH, most commonly atonic uterus, but also traumatic injury, coagulation defects or retained placenta could be the cause of a bleeding.

If the uterus feels flabby, the bleeding is likely to be from an atonic uterus. If uterus is hard and contracted the bleeding is likely to be of traumatic origin (32).

As mentioned above, atonic uterus is the most important cause of bleeding. With the separation of placenta, the uterine sinuses which are torn cannot be compressed effectively if there are imperfect contractions and retractions of the uterus, and there will be continued bleeding.

Predisposing causes are excessive uterine distension (twins, large baby), multiparity, prolonged labour, general anaesthesia, malnutrition and anaemia, retention of placenta, malformation of the uterus and labour augmented with Syntocinon (29).

When a bleeding occurs, a rapid evaluation of the general condition of the woman should be made, including pulse, blood pressure, respiration and temperature. If shock is suspected, the treatment should start immediately.

The uterus should be massaged until it contracts (27). Uterine contractions are maintained by ergometrine and oxytocin (28). Ergometrine produces tonic contractions of the uterus and is also a vasoconstrictor, so it may therefore cause elevation of the blood pressure. Oxytocin produces rhythmic contractions of the uterus (29). Prostaglandins can also be used, but should not be given intravenously (27). IV infusion of fluid should be started, and the bladder should be emptied. If possible, arrangements for blood transfusion should be made (27).

Placenta should be examined for evidence of missing cotyledon or pieces of membranes. If there are signs of retained placental fragments, this should be removed manually, as they could inhibit effective uterine contraction.

If the bleeding continues in spite of this management, bimanual compression of the placental site can be used to control the bleeding. An aseptic right hand should be inserted into the vagina like a cone, and placed into the anterior vaginal fornix and against the uterine wall. Left hand should be placed down behind the uterus abdominally and pressed against the fist in the vagina, and this bimanual compression must be maintained until uterus contracts and the bleeding is controlled (27).

Alternatively, the aorta can be compressed through the abdominal wall, to the point of losing femoral pulse (27).

Tight intrauterine packing is not recommended by WHO, as it is ineffective and wastes precious time. Older textbooks mention hot intrauterine douche as an effective method to stimulate the uterus to attain its tone. The temperature of the fluid should be about 47°C and some antiseptic lotions are mixed in the douche (32). This treatment is not recommended by WHO either.

If all above treatments fail, uterine and utero-ovarian arteries should be ligated, and if this also fails, the only option remaining is to perform a hysterectomy (27).

#### **7.10.4. Management of traumatic PPH**

This complication is due to lacerations or tears of cervix, vagina or the perineum. It can bleed from external or internal trauma. Bleeding starts immediately after birth of baby, and the flow is continuous. Uterus is in good tone and may be firmly contracted. The birth canal should be examined under good light by speculum, and tears should be treated with continuous catgut sutures (27).

#### **7.10.5. Secondary PPH**

The bleeding usually occurs between 8th and 14th day of delivery. The causes are (32)

- Retained bits of cotyledon or membranes.
- Laceration and infections.
- Subinvolution of the placental site.
- Secondary haemorrhage from a C.S. wound
- Withdrawal bleeding following oestrogen therapy for suppression of lactation
- Other rare causes

Internal examination should be done to reveal lacerations, infections or subinvolution. Sonar is useful in detecting pieces of placenta inside the uterine cavity. The treatment is either conservative or active, but as the commonest cause is due to retained bits of cotyledon or membranes, it is preferable to explore the uterus urgently under general anaesthesia. The materials removed are to be sent for histological examination. Presence of bleeding from wound should be sutured (32).

#### **7.10.6. Postpartum haemorrhage at the Mursan clinic (29 cases):**

During 2007 the Mursan clinic had 29 cases of postpartum haemorrhage, in other words, about 11 % of the women suffered from this complication.

One was a delayed PPH (after 3 days), the rest occurred within 24 hours after delivery.

12 of the cases had en episiotomy.

One was a twin delivery.

Two was breech deliveries.

In nine of the deliveries, tears have been reported.

In one of the cases the doctor had to do a manual removal of the placenta.

One case was a home delivery.

One had eclampsia.

18 of the woman had no ANC, while the rest received from one to seven checkups.

The staff in the clinic mainly followed the WHO's recommendation, but they also used intrauterine packing and hot intrauterine douche in emergencies. As the clinic have no facilities for blood transfusion and hysterectomy, they have to try all other possibilities, which is why these procedures still is preformed at the clinic.

### **7.11. RETAINED PLACENTA**

#### **7.11.1. Definition:**

The third stage of delivery, from the delivery of the child until the expulsion of the placenta and membranes, remains the most unpredictable and dangerous stage of labour from the mothers point of view.

The usual duration of this stage is 5 – 15 minutes, but any period up to one hour may be considered as normal. At term 90 percent of placentas will be delivered within 15 minutes. Once the third stage exceeds 30 minutes there is a tenfold increase in the risk of haemorrhage. Separation of the placenta is brought about by the contraction and retraction of the uterine muscle, which thickens the wall and reduces the capacity of the upper uterine segment so that the area of the placental site is diminished, and the placenta separates from the wall (28).

There are different types of retained placenta:

1. Placenta separated, but undelivered. There have been signs of placental separation: bleeding, alteration of the shape of the uterus and lengthening of the cord.
2. Placenta partly or wholly attached. Partial separation will cause bleeding, but the fundus will remain broad because the placenta still occupies the upper segment.
3. Placenta accreta is a rare cause of retained placenta. There is abnormal adherence of the placenta to the uterine muscle due to a defect in decidual formation. It is usually partial and presents by partial separation accompanied by bleeding. On rare occasions it is complete, and bleeding is absent. Attempts at manual removal opens the blood sinuses, possibly causing severe bleeding, and hysterectomy may be necessary (29).



### **7.11.2. Management:**

To ensure quick contraction and thereby diminish blood loss after birth, a uterus-contracting drug should be given when the anterior shoulder is out, normally oxytocin, or an uterus-contracting prostaglandin analog (29). Ergometrine should not be given, as it causes tonic uterine contraction, which may delay the expulsion (27). The mother should «push» to deliver the placenta.

If the placenta is retained as a whole, the cervical canal and the vagina should be checked, and if the placenta is in reach, the woman should try to push it out, or it could be removed manually. After waiting over 30 minutes without placental delivery, the uterus should be rubbed up to a contraction and placenta should be tried removed by controlled cord traction, while the other hand pulls uterus upwards abdominally to avoid inversion. A full bladder could effect the process, so it is important to catheterize first. If controlled cord traction is unsuccessful, the placenta should be removed manually, MRP (27). This procedure has many complications and should only be done without general anaesthetics in grave emergencies (27). Vulva should be cleaned and smeared with antiseptic cream, and as an aseptic left hand holds the umbilical cord, the right, with its thumb in the palm shaped like a cone, should be inserted into the vagina and follow the cord up to the placenta. The fingers should be placed between the placenta and deciduas, and with the palm facing the placenta, sideways sliding movements should be used to gently detach the placenta. Throughout the procedure the uterus should be steadied abdominally. When the placenta is completely separated a contraction should be rubbed up, and the contractions will expel the hand with the placenta (28).

When a portion of the placenta is retained, it can prevent the uterus for contracting effectively. Manual exploration similar to above should be used to feel the inside of the uterus for fragments, which can be removed by hand, ovum forceps or a curette (27).

Antibiotics should be routinely administrated as there is significant association between manual removal of the placenta and postpartum endometritis (28).

### **7.11.3. Retained placenta at the Mursan clinic (13 cases):**

In the Mursan clinic, the handling of the third stage differ according to the person who perform the delivery, some await the placentas delivery to come «naturally» while others apply steady traction on the cord right after the delivery of the baby. The uterus is rubbed up to contraction, and the cord is pulled with steady traction until the placenta is seen, then the grip is shifted, and the placenta is twisted out. After delivery the placenta is examined, to see if it is complete, and the cord is examined to see three vessels. If the baby is a boy, the placenta is kept, as the tradition say that it is good luck to bury down the boy's placenta outside the family's house.

If the placenta remained retained, the procedure of MRP is preformed, like described above, but without general anaesthesia, which is not available at this clinic.

After the delivery of the placenta, the uterus is cleaned with a sterile pad, and checked for pieces of placenta or membranes. A sterile pad with antibiotics is placed in the vagina for the next hour.

During 2007, the clinic had 13 cases of manual removal of a retained placenta, and three cases of retained pieces of the placenta.

Six of these cases were home deliveries or delivered right outside the clinic.  
One of the women was noted to be preterm labour, with a spontaneous abortion after 6 months.  
One of the babies was macerated.  
One of the MRPs was preformed only 5 minutes after delivery of the baby.  
Six of the deliveries had other complications in addition to the retained placentas.  
Two of these had PPH.

Only two of these 16 women had been to ANC, and these women received only one checkups each.

The incidence of retained placenta according to the textbook «Obstetrics by ten teachers» is two in 100 deliveries, and 20-fold increased risk at gestation < 26 weeks, and even up to 37 weeks it remain three times more common than on term (29).

During 2007, we noted 261 deliveries in the clinic, and when 16 of these cases had degrees of retained placenta, this counts for about 6 %, which is 4 % above the mean. One of these was below 26 week, but if we take this one out of the statistics, we get 5,8 percent, which is still very high.

#### **7.12. MACERATED FETUS (one case):**

Intrauterine death may be the result of fetal growth restriction, fetal infection, cord accident or congenital anomalies. Where syphilis is prevalent, a large proportion of fetal deaths are due to this disease (27).

Retention of a foetus after its death, for a period of several weeks, is rare, but may happen.

Death of the foetus occurs unnoticed or is marked by some vaginal bleeding. Symptoms of pregnancy regress, and the uterus shrinks as liquor is absorbed. The pregnancy test will become negative, and the ultrasound confirms the diagnosis.

If retained long enough before detection, the gestation may have ended up as a carneous mole, or a macerated foetus (29).

**Carneous mole** is a lobulated mass of laminated blood clot. The projections into the shrunken cavity are caused by repeated haemorrhages in the chorio-decidual space. In very early pregnancies, complete absorption of the dead ovum may occur (29).

In a **macerated foetus**, the skull bones collapse and override and the spine is flexed and there is little or no amniotic fluid in ultrasound examination. The internal organs degenerate and the abdomen is filled with bloodstained fluid. The skin peels off very easily. Pathological changes in the foetus such as mummification and calcification are very rare (29).

In 2007, the Mursan clinic had one case with a macerated foetus. This delivery was breech, an obstructed labour, and the placenta had to be manually removed. The woman had not been to any antenatal checkup, and had a very low Hb. (7,8) This pregnancy was her 10<sup>th</sup>. She was Hep B reactive.

## **8. SUMMARY AND CONCLUSIONS:**

During our five weeks stay in Mursan, we had an extraordinary opportunity to observe the work at a rural primary health care institution. By observing everyday life at the clinic, we got a good impression of the important work that is done at this facility, and we saw how important it was for this society to have an alternative to the local governmental health institution. The governmental offer to the inhabitants in this area is of very poor quality, and the incidence of 'self-educated'-doctors in the village is high. The Methodist Public Health Centre provides a level of care with standards high above the other alternatives in the area, both when it comes to hygiene and knowledge, and the price for the clinic's services is relatively low. As the clinic now has become a part of the governments BPL-project, where all women below the poverty line get the right to a free delivery, the clinic is able to do even more for the poorest people in this society. To make the people seek services that can improve their health and the health of their children, it is of great importance that the services provided are given at low expenses, and that the staff and the health institution's procedures are trusted by the people.

The Methodist Public Health Centre provides different kinds of services. In our study we focused on the work in the mother and child sector. The clinic provides services along all the three pillars mentioned in the WHO Department of Making Pregnancy Safer, including antenatal care given at three different locations, delivery-room with professional health personnel open 24 hours, ward for postpartum care and vaccination-programs, both for mother and child.

With a special delivery-room for HIV-positive women, the clinic can provide a safe delivery for both mother, child and the staff, and this is a important part in the work against HIV prejudice, and especially important as we have learned that the district hospital reject these women. HIV awareness is of great importance in this area, where these problems have been neglected by the government too long.

Emergencies during pregnancy or delivery can be handled at the clinic in less advanced cases. In more severe cases, the patient is sent to either the district hospital in Hathras or to the University hospital in Aligahr.

Help in family-planning is available, both in terms of hormonal contraception and at sterilization-camps, which are arranged several times a year

We observed 30 deliveries during our stay in Mursan, all of them with vertex presentation. One woman arrived in the clinic with a footling breech presentation, but she was sent to Hathras for a CS as she had been in labour for a long time, and vaginal delivery seemed hazardous. Two of the deliveries were carried out in the HIV-delivery-room, as the mothers were hepatitis B -positive. One of these mothers had a forceps assisted delivery, as she had inadequate uterine activity. The remaining 28 deliveries were carried out in the main delivery room. All of the deliveries we observed resulted in a living baby, although four of them needed resuscitation and one was sent to the paediatric ward in Hathras immediately after delivery. In addition to the deliveries, we observed one curetting after a home abortion and one suturing of a 3<sup>rd</sup> degree perineal tear after a home delivery.

We have compared the observed antenatal care and the management of the complications at the clinic with the guidelines given by the WHO and existing literature. We found that the guidelines are followed to a great extent. Some guidelines are not yet implemented, and we find two main reasons for this fact:

1. It takes some time for new guidelines to be implemented at the clinic.
2. There are no anaesthesiological facilities and facilities for blood transfusion.

Episiotomies were performed on all primigravidae, showing that this practice has not yet changed. Both episiotomies and injuries to the birth canal were sutured with continuous sutures in the inner layers and interrupted sutures in the skin. The new evidence showing that even the outer layer should be closed with continuous sutures (33) has not yet been implemented.

The remaining delivery complications we observed (retained placenta, retained bits of placenta, cervical lacerations, PPH, asphyxia and raised blood pressure during delivery) were in general managed according to the WHO-guidelines. There are a few exceptions to this:

The WHO emphasizes that manual removal of placenta should only be done without general anaesthesia in grave emergencies. As there are no possibilities to give general anaesthetics at the Mursan clinic, MRP is performed without it.

In presence of PPH, the staff in the clinic mainly followed the WHO's recommendations, but they also used intrauterine packing and hot intrauterine douche in emergencies. As the clinic have no facilities for blood transfusion and hysterectomy, they have to try all other possibilities in an emergency situation.

Forceps is used in most cases where there is need for instrumental assisted delivery. According to the WHO guidelines, ventouse is to be preferred before forceps, as it is less likely to injure the mother. At the Mursan clinic the doctors and midwives performing the instrumental assisted deliveries have more experience using forceps and for this reason they still prefer this technique.

Abortions are not performed at the clinic, but curetting after spontaneous abortions are done – to avoid severe bleeding in relation to the abortion.

There are no cases of severe infection in our material. However, there are some cases of infection to the stitches after an episiotomy or tear. According to the staff at the clinic, the main reason for these infections is lack of personal hygiene. This illustrates the need for information to the women and their families in the postnatal period.

The antenatal care services available at the clinic, are of good quality, but are poorly documented. By using standardized registration-forms for antenatal care, the staff can ensure that all tests and examinations are performed at the right time, and it will be easier to monitor the patients health during pregnancy. There are computers available at the clinic, and the staff has the opportunity to participate in computer-classes. With these resources available, the clinic should be able to transfer their patient-records to a computer-based journal-system.

The WHO recommendations are ideally followed, but this depends both on the patients first arrival at the clinic, and the decisions made by the patient and her family when it comes to which elements of care they wish to receive. The care given by the doctors is also variable in its content, and the emotional support in this setting could have been better. The midwives control most of the antenatal care, and they have the closest contact with the patient. Most of the important work preparing the woman for the delivery, and getting her to deliver safely in the clinic, is done in this relationship. By involving the doctor more, and improving the doctor-patient relationship, an even stronger influence could be made on the mother in the choice of delivery-form.

Only about 30 percent of the women delivering in the clinic, have received antenatal care at the facility. The rest have either received care at another facility, or in most cases, not at all. We see no correlation between the level of antenatal care given and the outcome of the delivery, but the fact that no women have died in the clinic in years, proves that giving birth in this facility prevents maternal mortality in itself.

The importance of getting the women to deliver in a health facility can not be stated clear enough, and the antenatal care checkups should be used more intensively to make this happen. With good

instructions during the pregnancy, the woman and her family will know how to act in different situations which could occur, and be able to seek help in an efficient way.

As we have seen, the main causes of maternal death worldwide are severe bleeding, infections, unsafe abortion, hypertensive disorders and obstructed labour. All of these conditions are seen at the Mursan clinic and managed so that maternal deaths are avoided. There are quite a few cases of PPH and related conditions (like retained placenta), prolonged or obstructed labour and hypertensive disorders among the women who deliver at the clinic. Some of these conditions might have led to severe morbidity or even death had they not been managed by skilled birth attendants at a well organized health institution.

## **9. SOURCES:**

1. WHO. The World Health Report 2005: Make every mother and child count. Geneva, 2005
2. WHO. Department of Making Pregnancy Safer, Annual report 2007
3. World Health Organization, Country Office of India. [www.whoindia.org](http://www.whoindia.org) (01.10.2008)
4. Department of Medical, Health and Family Welfare, Government of Uttar Pradesh. [www.uphealth.up.nic.in](http://www.uphealth.up.nic.in) (20.10.2008)
5. Methodist Public Health Center, Mursan, District Hathras, Uttar Pradesh, India. <http://www.methodisthealth.net> (01.10.2008)
6. World Health Organization, Department of Making Pregnancy Safer, [http://www.who.int/making\\_pregnancy\\_safer/topics/maternal\\_mortality/en/index.html](http://www.who.int/making_pregnancy_safer/topics/maternal_mortality/en/index.html) (12.11.2008)
7. Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gülmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews* 2001, Issue 4
8. United Nation. Estimates of MMR, number of maternal deaths, lifetime risk, and range of uncertainty in UN MDG regions, 2005.
9. Shelah S Bloom, Theo Lippeveld, David Wypij. Does antenatal care make a difference to safe delivery? A study in urban Uttar Pradesh, India. *Health Policy and Planning* 14 (1): 38-48, Oxford University Press 1999
10. Dr Carine Ronsmans MD, Prof Wendy J Graham Dph, et al. Maternal Mortality: who, when, where and why. *The Lancet* 2006: 368 (9542) 1189-1200.
11. World Health Organization. [http://www.who.int/features/factfiles/maternal\\_health/maternal\\_health\\_facts/en/index1.html](http://www.who.int/features/factfiles/maternal_health/maternal_health_facts/en/index1.html) (12.11.08)
12. BR Ganatra, KR Goyaji and VN Rao. Too far, too little, too late: a community-based case-control study of maternal mortality in rural west Maharashtra, India, *Bull World Health Organ* 76 (1998) 591–598.
13. WHO. Department of Making Pregnancy Safer, Annual report 2007
14. Richard Horton. Countdown to 2015: a report on maternal, newborn and child survival. *The Lancet*, 371 (9620) 1217-1219
15. National family health survey (NFHS-3), 2005-06, International Institute for Population Sciences (IIPS) and Macro International. 2007. India: *key findings*. Mumbai: IIPS. <http://www.nfhsindia.org> (01.10.2008)

16. United Nations. <http://www.un.org/millenniumgoals/bkgd.shtml> (12.11.2008)
17. United Nations. <http://unstats.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm> (12.11.2008)
18. The Millenium Development Goals Report, 2008. UN.(12.11.08)
19. World Health Organization. [http://www.who.int/reproductive-health/publications/RHR\\_01\\_30/RHR\\_01\\_30\\_chap3.en.html](http://www.who.int/reproductive-health/publications/RHR_01_30/RHR_01_30_chap3.en.html) ( 16.11.2008)
20. World Health Organization. [http://www.who.int/reproductive-health/publications/RHR\\_01\\_30/RHR\\_01\\_30\\_chap4.en.html](http://www.who.int/reproductive-health/publications/RHR_01_30/RHR_01_30_chap4.en.html) (16.11.2008)
21. World Health Organization. [http://www.who.int/reproductive-health/publications/RHR\\_01\\_30/RHR\\_01\\_30\\_chap4.en.html](http://www.who.int/reproductive-health/publications/RHR_01_30/RHR_01_30_chap4.en.html) (16.11.2008)
22. Shelah S Bloom, Theo Lippeveld, David Wypij. Does antenatal care make a difference to safe delivery? A study in urban Uttar Pradesh, India. *Health Policy and Planning* 14 (1): 38-48, Oxford University Press 1999
23. Sing, A. Profile of traditional birth attendants in a rural area of north India. *J Nurse Midwifery* 1994 Mar-Apr; 39(2): 119-23
24. Ministry of Health and Family Welfare, Government of India. [www.karmayog.org](http://www.karmayog.org) (20.10.2008)
25. National Institute of Health and Family Welfare. [www.nihfw.org](http://www.nihfw.org) (20.10.2008)
26. C. Kettle, S. Tohill. Perineal Care. BMJ Clinical Evidence search and appraisal April 2007 <http://clinicalevidence.bmj.com> (20.10.2008)
27. World Health Organisation, Department of Reproductive Health and Research (RHR). <http://who.int/reproductive-health/impac> (20.10.2008)
28. Campbell, Lees. Obstetrics by ten teachers. London: Edward Arnold (Publishers) Ltd, 2006. 18<sup>th</sup> edition.
29. Hanretty, Kevin P. Obstetrics Illustrated. London: Churchill Livingstone, 2003. 6<sup>th</sup> edition.
30. Wikipedia. [http://en.wikipedia.org/wiki/Apgar\\_score](http://en.wikipedia.org/wiki/Apgar_score) (12.11.2008)
31. Leah L Alberts, Kay D. Sedler, et al. Factors related to genital tract trauma in normal spontaneous vaginal births. *Birth*, 2006 Jun; 33(2): 94-100
32. D. Dutta. Textbook of Obstetrics. Calcutta: New Central Book Agency, 1992. 3<sup>rd</sup> edition.
33. Kettle C, Hills RK, Ismail KMK. Continuous versus interrupted sutures for repair of episiotomy or second degree tears. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD000947. DOI: 10.1002/14651858.CD000947.pub2.